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ABSTRACT

This document contains six research papers: "Articulation Practices among Secondary and Postsecondary Vocational-Technical Education Programs" (Bob R. Stewart, Sandra Eckert-Stewart); "What Message Are We Sending to Counselors about Their Role in Tech Prep?" (Paula Puckett); "From School-to-Work: Secretaries' and Machinists' Representations of Their Occupations" (Marcelle Hardy); "Vocational Student Success in Distance Education Courses" (Michael K. Swan, Diane H. Jackman); "The Motivation of Students to Participate in Distance Education: An Assessment Based on Houle's Typology" (Allen D. Truell); and "An Equivalency Study Comparing Paper-Pencil and Internet-Based Occupational Competency Tests" (Jerome T. Kapes, et al.). (KC)

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Vocational Education

Special Interest Group

1998

Proceedings

American Educational Research Association

1998 Annual Meeting
San Diego, California

April 13 - 17, 1998

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1998 Annual Meeting
San Diego, California

April 13 - 17, 1998

Diane H. Jackman
SIG Program Chair and Proceedings Editor
North Dakota State University

NOTES FROM SIG PROGRAM CHAIR

The 1998 American Educational Research Association (AERA) annual meeting was held in San Diego, California, April 13 - 17. The theme for the AERA conference was "Diversity and Citizenship in Multicultural Societies." The Vocational Education Special Interest Group (SIG) had two paper presentation sessions and a business meeting during the AERA annual meeting.

Each paper presented during the Vocational Education SIG sessions was selected through a blind, peer refereed process. Each paper proposal submitted was read by three reviewers.

Inclusion of the papers in the Conference Proceedings does not preclude the submission of the papers to any refereed journals.

A copy of the SIG program agenda is provided on the following pages. The papers included in the Proceedings were submitted within the designated time frame provided to each of the presenters.

Diane H. Jackman, Ph.D.
Vocational Education SIG
Program Chair and Proceedings Editor

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Vocational Education SIG Program

1998 AERA Annual Meeting
San Diego, California
April 13 - 17, 1998

Monday April 13, 1998

Session Title: Vocational Education SIG Business Meeting
Session Number: 7.39
Location: Hyatt, Presidential Boardroom, 2nd
Time: 6:15 p.m. - 7:45 p.m.

President: Wanda L. Stitt-Gohdes, University of Georgia
Program Chair: Diane H. Jackman, North Dakota State University
Secretary: Hollie B. Thomas, Florida State University

Tuesday April 14, 1998

Session Title: Connections in Vocational Education Programs
Session Number: 9.31
Location: Marriott, La Jolla, South Tower, Level 4
Time: 8:15 a.m. - 10:15 a.m.

Chair: Diane H. Jackman, North Dakota State University

Participants:

Articulation Practices Among Secondary and Postsecondary Vocational-Technical Education Programs.
Bob R. Stewart, University of Missouri-Columbia;
Sandra Eckert-Stewart, Northwest Missouri State University

What Message Are We Sending to Counselors About Their Role in Tech. Prep.
Paula Puckett, Parkland College

Integrating NCTM Standards in Occupational Contexts: Is Anybody There Yet?.
Victor Hernandez-Gantes, University of Wisconsin, Madison

From School-to-Work: Secretaries and Machinists Representations of Their Occupations.
Marcelle Hardy, University of Quebec, Montreal

Tuesday April 14, 1998

Session Title: Alternative Learning Environments
Session Number: 17.29
Location: Marriott, La Jolla, South Tower, Level 4
Time: 4:05 p.m. - 6:05 p.m.

Chair: Hollie B. Thomas, Florida State University

Participants:

Vocational Student Success in Distance Education Courses.
Michael K. Swan, Washington State University;
Diane H. Jackman, North Dakota State University

Teaching and Learning in Work-Based Learning: A Sociocultural Perspective.
Cathleen Stasz & Tessa Kaganoff, RAND

The Motivation of Students to Participate in Distance Education: An Assessment Based on Houle's Typology.
Allen D. Truell, University of Missouri, Columbia

An Equivalency Study Comparing Paper-Pencil and Internet-Based Occupational Competency Tests.
Jerome T. Kapes, Linda Martinez, Chui-Fang IP, Texas A&M University;
Thomas Slivinski, Webster, Inc.; Susan Hardwicke, Edotest, Inc.

Papers

Presented

ARTICULATION PRACTICES AMONG SECONDARY AND POSTSECONDARY VOCATIONAL-TECHNICAL EDUCATION PROGRAMS

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Maryville, Missouri 64468

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Practical Arts & Vocational-Technical Education
University of Missouri-Columbia
Columbia, Missouri 65211

Introduction/Theoretical Framework

Articulation between educational levels requires recognition of the paradigms of hierarchy in institutions and the willingness of administrators to change those paradigms. Identifying the perceptions of articulation held by administrators of vocational programs in area vocational-technical schools and administrators of community colleges offering vocational-technical programs assists in understanding theses paradigms. "Changes are driven by a special phenomenon—a change in paradigms....Being able to understand these changes will give you a better chance to anticipate them" (Barker, 1990, p.2). Barker indicated that a dramatic improvement of exploratory skills can be gained by consciously knowing our present paradigm and how this paradigm interferes with our perception of the future.

Interest in articulation between educational levels has been evident for more than 60 years, though interest in articulation of programs of occupational education has only been evident the last 35 years. By the mid 1970s, some postsecondary institutions had articulation activities underway for their occupational programs, and there were enough articulation agreements to prompt several national studies. Vogt (1991) reported that the National Advisory Council on Vocational Education surveyed State Advisory Councils in 1976 and found planned articulation between secondary and postsecondary levels of instruction in slightly less than 40% of the states. Even when some states required articulation via their state plans only a few programs at the study sites continued to operate within their articulation agreements after a few years (Bushnell, 1978). There are several critical factors essential for developing inter-institutional articulation. As was found by Gillies (1986) and Menacker (1975), articulation of educational programs between two or more institutions often is a misunderstood concept. Ernst noted, "The most important factor in implementing such a definition of articulation is that of attitude. This includes attitude of all institutions and agencies involved in the articulation process" (Ernst, 1978, p. 33). There is agreement that characteristics of successful articulation practices include institutional commitment, cooperative planning, communication, and mutually shared benefits (Day, 1985; Kirkbride, 1988; Long, Warmbord, Faddis, & Lerner, 1986). Ernst suggested that articulation is problematic when a clear working definition of the term is not understood by those individuals involved in formulating a collaborative arrangement (1978). Each administrator of vocational education programs must understand the perceptions held regarding articulation when coordinating with other institutions.

After reviewing numerous definitions of articulation in the literature, several commonalties emerged, including coordination and cooperation between institutions, movement of students between programs or institutions without duplication, and planning to ensure the student's continuous learning (Bushnell, 1977; Full, 1989; Heiman, 1983; Henderson, 1987; Kirkbride, 1988; Opachinch & Linksz, 1974; Strom, 1978).

The key to effective and efficient education and training for today's workforce seems to be effective and efficient articulation between educational institutions. The impetus and implementation for this effort needs to come from those who are in the change agent position—the administrators of vocational education.

Purpose

The primary purpose of the study was to determine Missouri vocational-technical administrators' perceptions of the articulation process, specifically in the three dimensions of articulation—information, communication, and interaction. The secondary purpose of the study was to ascertain the differences and similarities in the perceptions of articulation practices held by Missouri area vocational-technical administrators and community college vocational-technical administrators. If there was a significant difference or a consistent agreement on the perception of items, then it might be logical to conclude that these perceptions of articulation by the Missouri vocational-technical administrators represent barriers or enhancers to successful articulation implementation and may be items to address in the articulation process.

Research Questions

1. What are the perceptions of Missouri area vocational-technical school administrators and Missouri community college vocational-technical administrators on the three dimensions of articulation—information, communication, and interaction?
2. Is there a significant difference between Missouri area vocational-technical school administrators' and Missouri community college administrators' perceptions on the three dimensions of articulation—information, communication, and interaction?

Methods

The research design for this study was ex post facto in nature. A distinguishing characteristic of an ex post facto study is that the variables of interest are out of the researcher's control, because their manifestations have already occurred or because they are inherently not manipulatable. Ex post facto studies resemble correlational studies in that the obtained relationships may have been produced by variables other than those investigated (Christensen, 1985).

Area vocational-technical school and community college administrators' perceptions of articulation were ascertained by using a modified version of the *High School-Community*

College Vocational Educator Perception Inventory (HS-CCVEPI) (Kauer, 1979). A panel of experts from vocational-technical education representing both secondary and postsecondary education reviewed the original instrument to establish content validity. Reliability was estimated on data collected from administrators of vocational education programs using the Kuder-Richardson 20 formula to be .86 overall and .86 for the information dimension, .92 for the communication dimension, and .91 for the interaction dimension. For this study, only respondents' perceptions of actual (extent being done) articulation practices were assessed and analyzed. The instrument measured three dimensions of the construct 'articulation'—information, communication, and interaction. Two items were added to make the instrument more current. These items asked about use of e-mail and a web page. The items required the respondent to select from a 5-point Likert-type scale of 4—extensively, 3—to some extent, 2—seldom done, 1—not being done, or 0—don't know.

The modified instrument (HS-CCVEPI) and a demographic data sheet, were mailed to 100 potential respondents with a cover letter describing the nature and importance of the study. A stamped, self-addressed return envelope was included with the instrument. All descriptive analysis and post hoc tests were employed using the SPSS, Base 7.0 for Windows (SPSS, 1996).

Respondents were requested to complete an information form containing items regarding the articulation dimensions of information, communication, and interaction. A multivariate analysis of variance (MANOVA) procedure for a two-by-three design was utilized to ascertain if there were differences in mean scores of the groups on the articulation dimensions of information, communication, and interaction. The alpha level was set at .05 to determine significance using the Pillai's trace criterion test statistic. The use of multiple dependent variables—information, communication, and interaction—was employed to increase the knowledge of the complex relationship that exists (Christensen, 1985). Independent variables in this study were the educational institutions with which the respondents were affiliated, community colleges, or area vocational-technical schools.

Data Sources

Reliance was placed on nonrandom procedures in selecting a sample for this study because of the expertise of the group. Kerlinger (1973) suggested that purposive samples represent the selection of an appropriate sample based on the researcher's skill, judgment, and needs. He pointed out that purposive samples are not probability samples, but their usefulness is judged on the basis of whether they work in predicting future behavior or attitudes of the target population. Kerlinger further suggested that purposive sampling is characterized by the use of judgment and a deliberate effort to obtain a representative sample by including presumably typical areas or groups in the sample. The choice of purposive samples is usually based on very practical reasons such as geographic diversity, wide range of types of subjects, accurate and accessible records, and accessibility of subjects.

The potential respondents for this study included 57 Missouri area vocational-technical school directors, 15 Missouri tech prep consortium coordinators, 12 Missouri community college presidents, and 16 Missouri community college deans of vocational education. A total of 84 of a possible 100 persons provided useable data for the study.

Results

Usable responses were received from 53 administrators in area vocational-technical schools and 31 administrators in community colleges. Descriptive information about the respondents is presented in Table 1. As a group, respondents tended to be male (80%) and over 45 years of age (79%). The majority (75%) had been in their position 10 years or less but had worked in vocational education for 16 or more years (61%).

Table 1
Number and Percent of Respondents by Age, Gender, and Experience

		Area Vocational-Technical Schools n=53		Community College n=31		Totals N=84	
		n	%	n	%	n	%
Age:	44 & younger	12	22.7	6	19.3	18	21.4
	45-56	34	64.2	17	54.8	51	60.7
	57 & over	7	13.2	8	25.8	15	17.9
Gender:	Male	48	90.6	20	64.5	68	81
	Female	5	9.4	11	35.5	16	19
Yrs in Position:	1-5	20	37.7	19	61.3	39	46.4
	6-10	14	26.4	10	32.3	24	28.6
	11-15	6	11.3	1	3.2	7	8.3
	16 or more	13	24.5	1	3.2	14	16.6
Yrs in Voc. Ed.:	1-10	9	17.0	9	29.0	18	21.4
	11-15	12	22.6	3	9.7	15	17.9
	16 or more	32	60.4	19	61.3	51	60.8

The responses for the three articulation dimensions—information, communication, interaction—by the 84 respondents were analyzed as individual items and by their group affiliation. Two research questions were formulated to guide the conducting of the study. The first research question addressed the perceptions of current articulation practices by Missouri vocational-technical administrators. The data indicated that the administrators of vocational-technical education are actively engaged in carrying out articulation practices. A summary of responses by group and dimension is reported in Table 2. The area vocational-technical school administrators indicated that for the 27 items in the information dimension the mean score was 55.66 with an item mean of 2.06; for the 15 items in the communication dimension the mean score was 36.98 with an item mean of 2.47; and for the 17 items in the interaction dimension the mean score was 36.98 with an item mean of 2.18. The community college administrators indicated that for the 27 items in the information dimension the mean score was 59.03 with an item mean of 2.19; for the 15 items in the communication dimension the mean score was 38.96 with an item mean of 2.60; and for the 17 items in the interaction dimension the mean score was 40.61 with an item mean of 2.39. For the combined group of respondents, the mean score for the 27 items of the information dimension was 56.90 with an item mean of 2.11; the mean score for the 15 items in the communication dimension was 37.72 with an item mean of 2.51; and the mean score for the 17 items in the interaction dimension was 38.32 with an item mean of 2.25. Both groups reported items in the communication dimension to be completed most often. The dimension with the lowest ratings was information.

Table 2
Dimension Total Scores by Affiliation

	Area Vocational-Technical Schools n=53		Community College n=31		Totals N=84	
	m sd	item m	m sd	item m	m sd	item m
Information (27 items)	55.66 14.52	2.06	59.03 15.39	2.19	56.90 14.85	2.11
Communication (15 items)	36.98 10.12	2.47	38.96 9.55	2.60	37.72 9.90	2.51
Interaction (17 items)	36.98 11.46	2.18	40.61 12.88	2.39	38.32 12.06	2.25

The response patterns were also examined to ascertain if there were obvious differences between the groups. Items with .5 or greater differences in mean scores were identified. These items are presented in Table 3. The response patterns for the communication and interaction dimensions tended to be very similar between the groups. However, the information dimension had 11 items with a .5 or greater difference in means. An examination of these items revealed that they dealt with questions regarding the administrator's knowledge of activities conducted by the other type of institution. Several of these items were completed as "don't know," indicating a lack of awareness of the activities of the other institutions.

Table 3

Items with Greater than .5 Difference in Means Between Groups

	Area Vocational-Technical Schools n=53		Community College n=31	
	m	sd	m	sd
The AVTS publicizes its programs in the community college district(s) through:				
2. Mailings to residents.	2.34	1.11	1.84	1.44
5. Ads or programs on a commercial radio station.	2.09	1.16	1.58	1.29
6. Ads or program on a dedicated radio station.	1.47	1.05	.97	.84
The community college(s) publicizes its vocational-technical education programs in the AVTS's sending districts through:				
9. Newspaper ads or news releases.	1.96	1.41	2.65	1.31
10. Mailings to residents	1.62	1.36	2.35	1.43
11. Ads or programs on commercial television.	1.21	1.08	1.84	1.21
12. Ads or programs on a dedicated television channel.	1.15	1.06	1.74	1.26
13. Ads or programs on a commercial radio station.	1.68	1.17	2.29	1.19
15. Information on Web Site.	1.04	1.18	1.90	1.30
The community college(s) provides information to prospective students from AVTS and to AVTS in the following areas:				
20. Vocational career preparation opportunities.	2.75	1.05	3.39	.67
21. Admissions requirements.	2.91	1.10	3.42	.72

Research question two was used to formulate the hypothesis that the perceptions held regarding the articulation process in the three dimensions—information, communication, and interaction—would not be significantly different between Missouri area vocational-technical administrators and Missouri community college administrators.

The independent variable for the hypothesis was the institutional affiliation, Missouri area vocational-technical school, or community college. The dependent variables for the hypothesis were the three dimensions of articulation—information, communication, and interaction. The hypothesis was tested at the .05 level of significance. The null hypothesis was formulated from the second research question to ascertain if there was a difference of perception of articulation practices between the administrators of vocational-technical education in Missouri area vocational-technical schools and Missouri community colleges. The results of the multivariate analysis of variance for differences in perceptions in the three dimensions yielded a F of .60 (df = 3,80; p = .62), which was not significant. Therefore, the null hypothesis was not rejected.

The data indicated the community college respondents self-admitted accomplishing the articulation tasks in all dimensions at a higher level than the area vocational-technical school respondents. There were no items having greater than a 0.5 difference in mean between groups for the communication and interaction dimensions. There were, however, 11 items for the information dimension showing a difference of 0.5 or greater between the groups—area vocational-technical schools and community colleges. Several of the items were completed with a "0" indicating a "don't know" status. In the case of the "don't know" responses, there was a similar pattern in the percent of respondents who were not familiar with activities of the other type of institution. Other items reflecting a low mean for both institutions included some unused methods of communication such as taped telephone messages but indicated a level of acceptance of new technology, the web page, and e-mail.

Overall, it was concluded, based on the findings of this study, that area vocational-technical school administrators and Missouri community college administrators tend to agree about the current level of implementation of articulation practices in Missouri.

Implications

The findings of this study were consistent with recommendations and implications of more recent studies (Mitchell,1989; Full,1989; Carter,1985; Heiman,1983; McCormick,1980), and found the perception of articulation between area vocational-technical school administrators and community college administrators are more similar than different. While there seems to be agreement, there are items and groups of items that rate both high and low. A related finding from the descriptive data found that a large number of vocational-technical administrators are nearing retirement.

The information construct indicated 11 items with a difference greater than 0.5 mean between the groups. These items were mainly questions regarding the leader's knowledge of activities of the other type of institution. The implication would be for the administrators to form a closer collaborative working relationship between schools. Areas of focus should be on how schools provide information to students, prospective students, and faculty who work with these students. A related item from the communication dimension addressed how dialogue occurs between institutions and their faculties. The responses suggested that few events were sponsored which provided for interaction among faculty and administrators of institutions involved in articulation. It would appear that informal gatherings and open house type activities to bring the groups together would be most helpful.

The response pattern for the communication and interaction dimensions tended to be similar between the two groups with no item having a difference in mean greater than 0.5. This would indicate that administrators working with articulation practices could focus on items yielding lower mean scores by examining the "don't know" and "not being done" categories indicating a lack of knowledge of the practice or that it is being done infrequently. Several items having a high number (50 to 70 percent) of responses in these areas can be found in the information dimension, which shows how the schools disseminate information, especially when it requests how the other type of institution informs potential students or faculty of programmatic items. The implication is to strive for a closer working relationship and become more aware of the activities of the other type of institution.

In the communication dimension, which shows how dialogue occurs between institutions and their members, only one item was observed to be noticeably low. The item asked if events were sponsored for faculty of both area vocational-technical school and the community college to interact on a social level. The implication would be for a concerted effort be given to this task. When faculties interact socially and get to know their counterparts, they gain a level of acceptance and trust that cannot be legislated by administrators or others.

The interaction dimension, which shows an interinstitutional activity resulting in a product, had several items that had relatively large (50 to 65 percent) number of responses in the "not being done" category. Those visually obvious were items regarding joint selection of faculty members, a shared vocational administrator, periodic exchange of vocational-technical faculty, join sponsorship of vocational student groups, and mass production of products. The implication given by these items seems to be actions that can occur only after a high level of trust has been established by working on the information and communication dimension first.

In summary, the implications gleaned from the data indicate that (a) the administrators of vocational-technical education need to review practices to see if they are indeed at the level they reported, (b) promote and encourage articulation practices already in place, (c) examine reasons why practices are not in place or the administrator is unaware of the practice, and (d) provide an atmosphere where a cooperative, collaborative interaction will be the rule rather than an exception.

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WHAT MESSAGE ARE WE SENDING TO COUNSELORS ABOUT THEIR ROLE IN TECH. PREP?

Paula Puckett, Ph.D.
Danville Area Community College

The publication of A Nation at Risk (1983) brought about many nationwide education reforms that raised the expectations of administrators, teachers, and counselors. In response, these people are being asked to master new skills and responsibilities (Barth, 1991; Corcoran, 1995; Fullan and Miles, 1992; Wehlage, Smith, & Lipman, 1992; Weissglass, 1991). Although the incorporation of all educational changes of value requires new skills, behavior, and beliefs, knowing how to contribute is not always clear (Joyce, Murphy, Showers, & Murphy, 1989). The reform movements of the 1990s "do not occur to parts of a system, but to entire institutions and to the people that inhabit them. Within education, change requires the integration of ideas and people to avoid superficial changes that disappear when personnel change or funding ends" (Cuban, 1988, p. 332).

One way to bolster reform efforts is to provide professional development that encourages individual change or a "cognitive redefinition" (p. 43) of beliefs and attitudes (Schein, 1988). When competing initiatives come as mandates, only those efforts with the most complete, best integrated plan will have lasting impact (McLaughlin, 1993). New educational reforms have presented challenges in designing professional development that engages participants in change (Guskey & Huberman, 1995; Pink & Hyde, 1992; Smylie, 1995). Part of the challenge stems from the roots of professional development.

In the 1970's professional development was typically used to remediate or improve skills of educators as a result of employee evaluations. The "Change Agent Study" by Berman and McLaughlin (1977) examined professional development practices linked to education reforms. Typical approaches to professional development were reported to be in-service days and workshops. According to McLaughlin and Marsh (1978), professional development was largely "ineffective and a waste of time" (p. 70). Since the 1970's, alternative models of professional development such as individually guided activities, observation, and collaboratives are being used in the context of reform and reported to be more effective than in-service days and workshops (Darling-Hammond, 1992; Fullan, 1991; Futrell, 1994; Little, 1993; Lord, 1991; Miller, Lord and Dorney, 1994).

Newer approaches to professional development appear to be more closely aligned with what is known about adult learning and development. Smylie (1995) suggests that adult learning theory can be applied to professional development within the context of educational reform. Andragogy, the study of how adults learn, is based on several assumptions that have implications for professional development: (a) adults have a deep psychological need to be self-directing; (b) adults come into an educational setting with a greater volume and different quality of experience than youth; (c) adults exhibit a readiness to learn that is linked to their need to know and be able to cope effectively with real-life situations; and (d) adults' orientation to learning is task or problem-centered rather than subject-centered (Knowles, 1970, p. 44). An educational organization engaged in reform could be thought of as a changing experiential world where learning can influence individual perceptions of what is important, and therefore change professional practices of counselors, teachers and administrators.

Counselor perceptions of mandated reforms are of special concern as their unique position in schools can involve them in the full range of institutional functions (Boley, 1994; Daly & Feller, 1992; Perry, 1992). Experiential learning theory suggests that counselors' personal and professional experiences as learners need to be considered because adults bring their own life experiences with them to new learning opportunities (Kolb, 1984). Approaches to professional development can be considerate of the participants as adult learners. However, approaches to professional development often fail to acknowledge the needs of the participants (Little, 1993). One reform effort purported to recognize the importance of both the role and professional development of counselors is Tech Prep.

The Fundamentals of Tech Prep

Counselors are identified as an important group to the educational reform known as Tech Prep, first envisioned and developed by Parnell (1985). According to Parnell, Tech Prep, or technical preparation, was intended to address problems with the existing high school curriculum or tracks of college-prep, general education, and vocational education. Parnell described the general education track as an "academic and vocational wasteland of American education" (p. 24). To address this problem, he suggested that students be prepared for the needs of the twenty-first century that are more technical in nature. The Tech Prep concept further developed with the Tech Prep Education Act, Title IIIE of the Carl D. Perkins Vocational and Applied Technical Education Act of 1990.

The federal law defines Tech Prep as a combined secondary and postsecondary education program which:

> 1. leads to an associate degree or 2-year certificate;
> 2. provides technical preparation in at least one field of engineering technology, applied science, industrial, or practical art or trade, or agriculture, health, or business;
> 3. builds student competence in mathematics, science and communications through a sequential course of study; and
> 4. leads to placement in employment (American Vocational Association, 1990, p. 102).

The federal Tech Prep Education Act focuses specifically on counselors in one of seven essential elements:

> Include training programs for counselors designed to enable counselors to more effectively--
> (a) recruit students for tech-prep education programs,
> (b) ensure that such students successfully complete such programs; and
> (c) ensure that such students are placed in appropriate employment.
> (American Vocational Association, 1990, p. 100)

Thus, the Tech Prep law provides an example of an educational reform that calls for the active involvement of counselors. As such, policy makers have recognized the need to provide learning opportunities for counselors involved in Tech Prep.

In practice, state and local entities appear to be cognizant of the general framework of the federal Tech Prep Education Act, but there is a great deal of variation in how Tech Prep is actually carried out (Bragg, Layton, & Hammons, 1994b; Office of Educational Research and Improvement, 1994; and Silverberg & Hershey, 1994). In 1994 the U.S. Department of Education held a focus group of national experts to identify important components of Tech Prep. The group concluded "integrated learning, the use of applied curricula, heavy emphasis on career development activities, articulation between high schools and community colleges, and a 'reality base' for students developed through [the] workplace or other community work experience" (p. 2) are all integral to Tech Prep. Members of the focus group "emphasized that the attitudes and habits of teachers, administrators and counselors need to change and that a lot of staff training is needed to make that happen" (p. 3).

Smylie (1995) posits there are conditions for the promotion of learning by education professionals. He calls for research to explore whether educators experience greater autonomy and choice in work roles and tasks when educational reform efforts occur (p. 104). The concepts of Tech Prep call for educators, especially counselors, to engage in various roles and responsibilities, and they are to learn about these roles and responsibilities through professional development designed specifically for them. Warnet (1994) stated that successful Tech Prep programs should involve everyone in the process, but deciphering what the reforms mean for the roles and responsibilities of everyone poses a major challenge. Counselors have multiple, conflicting responsibilities, from working with students who want to attend college but do not possess the academic and financial means to succeed in a four-year institution; to disciplinarian, responsible for enforcing rules such as dress code; to substitute teacher and administrator (Gysbers & Henderson, 1994). Hoyt, Hughey, and Hughey (1994) stated that there is a need to "help counselors change themselves in ways that will better enable them to play a proper and useful role in meeting career development needs through Tech Prep and other 'schooling-to-employment' programs" (p. 2).

Counselors at the secondary and postsecondary levels have multiple responsibilities. Tech Prep reform requires counselors perform roles that may or may not be a part of their regular routine. One of the seven essential elements of Tech Prep is professional development for counselors, suggesting that counselor roles and responsibilities do influence the success of Tech Prep. However, there is not a single, specific plan for the professional development of counselors at either the secondary or postsecondary levels. Rather, professional development has occurred in many ways and there is little research to document how various professional development approaches relate to counselor perception of role in Tech Prep. Although studies have examined personal and professional experiences as they are defined in relation to the existing educational system, it is not known how counselors perceive of their role in Tech Prep.

Adult learning as a part of professional development can take many forms. It can focus on training and skill development; it can be centered around experiential, collaborative relationships; or it can be a combination of various segmented (one-time training sessions) and shared growth (collaborative, reflective, experiential, on-going, self-directed) approaches (Smylie, 1995; Little, 1993; Darling-Hammond & McLaughlin, 1995; Fullan, 1991; Guskey 1995; Lieberman, 1995). Furthermore, professional development is not likely to act independently on counselor perceptions of role, but in combination with other personal and professional experiences. Understanding these complex relationships can have important benefits on several levels, including to counselors and the educational organizations they represent.

Specifically, the study attempted to answer the following research questions:

1. What approaches to Tech Prep professional development were used with selected secondary and community college counselors?
2. How do secondary and community college counselors perceive of their roles and responsibilities in Tech Prep
3. What is the relationship among professional development approaches, and counselor perceptions of role in Tech Prep?

Purposive sampling was used to identify all counselors affiliated with seven model Tech Prep demonstration sites in Illinois. The entire population of 232 counselors was surveyed for this study; a total of 148 surveys were returned for a 64% return rate. Of the 232 surveys mailed, 2 or less then 1% were returned because the counselor no longer worked at the institution. A total of 25 non-respondents (30%) were contacted by telephone to determine whether there were differences between them and the respondent group. Statistical analysis of the selected survey items revealed no significant differences between the two groups.

A survey designed by the researcher was used to collect information pertinent to the research questions. Part I of the survey focused on counselor experience and background. It collected data on personal and professional background and organizational characteristics based on related literature (Benson, 1984; Chenault, 1996; Coll & House, 1991; Laborde, 1983; McKenna, 1993; and Pryor, 1984). This part of the questionnaire ascertained the perspective of counselors as adult learners and helped to describe the sample.

Part II of the questionnaire centered around counselor participation in various professional development approaches. Survey items were gleaned from literature focusing on professional development in the context of educational reform (Smylie, 1995; Little, 1993; Darling-Hammond and McLaughlin,1995; Fullan, 1991; Guskey 1995; Lieberman, 1995). and Tech Prep (Bragg, 1995; Chenault, 1996; Dornsife 1992; Kwasny, 1992; Maddy-Bernstein & Cunanan, 1995; McCharon, 1995; Schmidt, Finch & Faulkner, 1995). Participation was defined in terms of whether counselors had taken part in 13 different Tech Prep professional development approaches. The perceived effectiveness of the professional development approaches was measured in terms of various results identified in the literature (Lieberman, 1995; McLaughlin, 1991; Sparks & Loucks-Horsley, 1990) and the degree of helpfulness the approach had in assisting counselors to understanding their counselor role in Tech Prep.

Part III of the questionnaire focused on the level of importance and preparedness for twenty-seven roles and responsibilities in Tech Prep. Respondents were asked to rate importance and preparedness on 5-point Likert-type scales for each of the 27 items which were identified in the literature (Bragg, et al, 1994b; Chenault, 1996; Dornsife 1992; Kwasny, 1992; Maddy-Bernstein & Cunanan, 1995; McCharon, 1995; Schmidt, Finch & Faulkner, 1995; Silverberg & Hershey, 1994).

The instrument was reviewed for content validity by an expert panel as well as by members of the researcher's doctoral committee. With minor changes based on input from the expert panel and doctoral committee, the survey instrument was mailed to participants in a pilot study and tested for reliability. The reliability of the four major scales presented in the questionnaire ranged from .67 to .94, indicating moderate to high reliability.

A pilot study was conducted to refine the questionnaire with the target population of counselors. After refinement of the instrument based on the pilot study, the questionnaire was mailed to counselors in the population. (None of the pilot study respondents were used in the main study.) A modified version of Dillman (1979) total survey design method was used, involving multiple follow ups over a seven week time period beginning January, 1997.

The data were tabulated and analyzed using the Statistical Package for Social Sciences (SPSS) software for the IBM computer. To answer the research questions, descriptive statistics were used to analyze much of the data. Factor analysis was applied to the preparedness for role scale and subsequent correlational analysis used these results to examine relationships between the six identified preparedness for role factors and other key variables. Content analysis of the open-ended survey responses was also used (Krathwohl, 1993). Qualitative responses were analyzed for recurring themes or patterns and organized under the theme headings and percents of total were calculated.

Major Findings

The analysis revealed the respondents to be predominantly male (54%), Caucasian (90%), 48 years of age, on average. Secondary and community college counselors were similar on demographic characteristics except community college counselors were much more likely to be African American (32%) than secondary counselors (5%).

Respondents varied in the amount of time they had been a counselor at their institution. A sizable proportion of secondary counselors had begun their counseling duties within the past five years (40%), where as a large proportion of community college counselors (44%) had been on the job for 6 to 10 years. The findings in this study supported Coll and House (1991), in that both studies found the average number of years counselors had been at their current institution was 12 years. Particularly at the secondary level, a recent influx of new counselors may provide an opportunity for learning about a recent reform such as Tech Prep. The mean counselor-to-student ratio was one counselor for every 315 students. This number was slightly less than the findings of 350 students per counselor by Gysbers and Henderson (1994).

The educational background of counselors indicated they had extensive schooling, as 83% had a Master's degree plus additional course work. This finding also supported the findings of Coll and House (1991) suggesting that counselors are not opposed to continued learning, though the survey did not ask how many years had lapsed between the last graduate course and the present date. Several counselors responded to an open-ended question about how to improve professional development counselors as follows: "make Tech Prep education part of school personnel training programs", and "provide financial reimbursement for graduate-level work."

A large proportion of the counselors (87%) had taught prior to their becoming a counselor. More secondary counselors reported having teaching experience than community college counselors (95% secondary, compared to 50% community college). At the secondary level, 20% taught English, whereas no community college counselors reported having taught English; 28% of the community college counselors had elementary school teaching experience and 22% had social science teaching experience.

Respondents were asked for the amount of time they spent on Tech Prep activities on a weekly basis. Secondary counselors reported an average of 2 hours and 45 minutes per week, whereas community college counselors reported less then 10 minutes per week on average. The combined group repored an average of 2 hours and 15 minutes per week suggesting an inverse relationship between perceived institutional support for Tech Prep and the allocation of time to it. Whereas more community college counselors view their institutions as supportive of Tech Prep than secondary counselors, they reported much less time committed to it on average. These results suggest some support for findings of other research showing counselors have multiple, and possibly conflicting duties preventing them from dedicating more time to Tech Prep activities (Chenault, 1996; Cunanan and Maddy-Bernstein, 1995; Dornsife, 1992).

Research question one asked what approaches to Tech Prep professional development were used with selected secondary and community college counselors? This research question pertained to the professional development approaches that secondary and community college counselors had participated in and the level of helpfulness the approaches had in gaining an understanding of their role in Tech Prep. Descriptive analysis revealed that a majority or nearly so of counselors were participating in reading newsletters and brochures about Tech Prep, collaborating with others on Tech Prep, and participating in a series of workshops or in a one-time Tech Prep workshop. Participation in site visits to local employers was also reported by nearly one-half of the respondents. Less than one-quarter of the counselors had participated in more intensive, on-going professional development approaches such as planning Tech Prep curriculum, participating in study groups, conducting self-directed projects, taking graduate courses, conducting action research, or conducting independent reflection. These findings show counselors were much more likely to be engaged in segmented approaches associated with "teaching as telling" methods (Lieberman, 1995, p. 592) than in shared-growth approaches that provide extensive opportunity for self-reflection and on-going learning about Tech Prep. These findings support existing research on counselor professional development with respect to Tech Prep (Bragg, et al, 1994b; Kwansy,1994; Silverberg and Hershey, 1994).

Counselors were asked to recall the nature of all the professional development they had participated in related to Tech Prep and to indicate the degree to which they strongly disagreed to strongly agreed with each statement. On a 6-point Likert-type scale, the overall mean ratings ranged from a low of 3.3 for 'I have begun to question how I've been approaching students', to a high of 4.4 for 'I understand the relevancy of Tech Prep' indicating the counselor respondents did not strongly agree or disagree with any of the statements. However, rather important differences were revealed between secondary and community college counselors.

While the overall mean indicated that counselors generally agreed they had more working relationships with people from business as a result of Tech Prep professional development, examination of the frequency of responses revealed that 66% of community college counselors very strongly disagreed or disagreed that they had working relationships with people from business, while 48% of secondary counselors disagreed. Secondary counselors (80%) believed that as a result of Tech Prep professional development they now had on-going dialogue about Tech Prep, where only 59% of community college counselors agreed with this statement. Secondary counselors (64%) felt they had information about articulation agreements, while 66% of community college counselors disagreed they had more information about articulation agreements as a result of Tech Prep professional development. At the community college level, 50% of counselors disagreed that they were more engaged in working with others on Tech Prep activities whereas 63% of secondary counselors agreed with this statement. These results suggest many of the respondents did not perceive of themselves as more knowledgeable of ways to perform their counselor duties as a result of Tech Prep professional development, especially at the community college level. While most agreed that they understood the relevancy of Tech Prep, they did not necessarily engage in working with others on Tech Prep activities such as joint planning or relationships with people from business. Furthermore, ambiguity of role was evident in the responses of counselors in that 39% of secondary and 38% of community college counselors disagreed with a statement about whether they were clear about what counselors were supposed to do related to Tech Prep. These findings support existing research on roles and responsibilities in Tech Prep (Roegge, Leach, & Brown, 1993).

When asked to identify the most helpful Tech Prep professional development in which counselors had participated, 40% of the respondents reported a wide range of approaches including on-going, monthly meetings involving counselors, business representatives, administrators, and teachers in sharing information about Tech Prep to one-time, mandated workshops and conferences to site visits to local employers. Only 10% of all respondents had taken a graduate course related to Tech Prep but their comments were positive because the course had provided time for discussion with colleagues (among other things). Finally, with respect to the first research question, respondents wrote about the most helpful professional devleopment experience in which they had participated. These written comments were wide ranging. Some reported positive experiences, other more negative. One of the more disconcerting comments made by a counselor was, "I feel as do many of the staff that Tech Prep is being rammed down out throat." Another counselor expressed concern in saying,

> In this area there seems to be little or no communication between teachers and administration and counselors and [the] regional delivery system. Counselors have little release time for professional development or independent research. All our staff development is outlined and mandated by our adminsitration with no room for suggestions.

These qualitative results suggest more opportunities are needed for counselors to participate in more time-intensive and collaborative professional development approaches. More time is needed for study groups, action research and structured observations to counselors fulfill their roles in Tech Prep. These findings support research findings that use of alternative models of professional development such as individually guided activities, observations and collaboratives in the context of educational reform were more effective than in-service days and workshops (Darling-Hammond, 1992; Fullan, 1991; Futrell, 1994; Little, 1993; Lord, 1991; Miller, Lord and Dorney, 1994; Smylie, 1995). In this regard, several counselors made comments summed by one respondent,

> There are pockets of Tech Prep that are commendable. As in so many cases, the success or failure of a program depends on the degree to which those in charge are honest and personable. All of us that are good at what we do and have spent a professional lifetime successfully working with students and their families want to keep abreast of technological and curricular innovations and enhancements. We are in it and have been in it for the long haul. We have learned not to fall for the fast talkers, we are in search of the sincere person who wants to assist us to give our students the best opportunities that can be generated.

Research question two of how do secondary and community college counselors perceive of their roles and responsibilities in Tech Prep was answered using descriptive analysis. Mean ratings indicated that the counselors viewed all the roles and responsibilities as at least fairly important; some were perceived as very important. However, none of the overall mean ratings were extremely well prepared or not at all prepared for any of the roles and responsibilities. The responsibilities cited as most important were those centering around career awareness and development of all students. Responsibilities rated as very important having a career component included assisting students with career decision making, assisting with individualized career plans, informing students of career opportunities upon graduation, and helping students learn about career options. Community college counselors saw the role of providing career development activities in the classroom as more important than secondary counselors. In contrast, secondary counselors reported being much better prepared to handle scheduling problems associated with academic and vocational curricula than their community college counterparts. These findings support research that found counselor perceptions of mandated reforms are of special concern as their unique position in schools can involve them in the full range of institutional functions (Boley, 1994; Daley & Feller, 1992; Perry, 1992).

Based on a Principle Axis Factor (PAF) analysis with varimax rotation, the six latent factors in the preparation for roles variables were: (1) provide student career orientation (43%), (2) maintain internal and external organization relationships (7%), (3) monitor programs (5%), (4) communicate (4%), (5) be a curriculum innovator(3%), and (6) serve as the market connection (2.5%).

The first factor was interpreted as providing all students with career oriented information. Nine of the twenty-seven roles and responsibilities appeared in this first factor that accounting for 44% of the variance. It was characterized by providing students with career orientation in several ways: assisting students with individual career plans, devoting as much time working with vocational-technical students as 4-year college bound, conducting interest and aptitude assessments to assist students in career decision making, assisting all students with career decision making, and conducting assessments to help all students plan meaningful educational goals. This factor also included providing information for students to consider alternatives to traditional career paths, informing all students of career opportunities at each program exit point, serving the needs of special populations and assisting students with portfolio development.

Maintaining internal and external relationships with other levels of education and business was the second factor. It accounted for 7% of the variance and included developing articulation agreements, providing inservice to other staff about business and industry partnerships, working with business representatives involved in Tech Prep, collecting information to support Tech Prep evaluations efforts, providing career development activities in the classroom (implying relationships with instructors), formulating a process for articulating Tech Prep credit, assisting exiting Tech Prep students with job placement (implying relationships with business), and conducting assessments to help all students plan meaningful educational goals. This final role also loaded under the student career orientation factor, suggesting that it was considered an important role in more than one facet of the professional lives of counselors.

Program monitoring with particular attention to time was the third factor that accounted for 5% of the variance. The variables that came up here were: resolving scheduling problems between academic and vocational curriculum, ensuring students complete Tech Prep, collecting information to support Tech Prep evaluation efforts, recruiting students for Tech Prep, providing all students with information about Tech Prep, devoting as much time working with vocational-technical students as four-year college bound students, and providing inservice to other staff about business and industry partnerships.

The fourth factor accounted for 4% of the variance and centered around communication. It included explaining to all students that Tech Prep options require high achievement levels, provide all students with information about Tech Prep, communicate with other counselors to identify prospective students for Tech Prep, informing all students of career opportunities at each program exit point, and participating in Tech Prep advisory committees. This factor also has an element of inclusiveness about it similar to the first factor, in that an emphasis on all students was evident in two of the roles.

Curriculum innovation appeared to be the theme of the fifth factor. It accounted for 3% of the variance and included thinking in new ways about curricular programs, planning curriculum to facilitate student acquisition and application of basic skills, providing career development activities in the classroom, and assisting students with portfolio development.

The sixth factor identified in the roles and responsibilities was that of market connection. It accounted for 2.5% of the variance and included assisting exiting Tech Prep students with job placement and recruiting Tech Prep students. These findings suggest an aspect of the counselor role involve their influencing the decisions students make regarding education and work futures.

In summary, based on a PAF with varimax rotation on counselor roles and responsibilities six factors were identified as important to counselors: (1) to provide students with career oriented information, (2) maintain internal and external relationships, (3) to monitor programs, (4) to promote communications, (5) to be a curriculum innovator, and (6) to serve as the market connection. These six factors help to reinforce the complexity of counselor roles and responsibilities, but help to bring order and greater understanding of them as well.

Research question three was what are the relationships among counselor professional development approaches and perceptions of roles and responsibilities? Relationships among professional development approaches, results and perceptions of roles and responsibilities were analyzed using Pearson product-moment correlations to the sum of the means of the variables that made up the six factors. This article will address a subquestion of how counselor participation in professional development approaches related to their preparedness for role?

Participation in Professional Development Approaches and Preparedness for Role Factors

Only some approaches to Tech Prep professional development were related to counselor preparedness for role in Tech Prep. In fact, only five of the professional development approaches were shown to relate to preparedness for role factors and these were: attendance at a series of Tech Prep workshops, participation in joint planning, planning Tech Prep curriculum, conducting self-directed Tech Prep projects, and participating in Tech Prep study groups. Several other approaches that were used more frequently were not related to preparedness for role. These included one-time workshops, reading newsletters and participation in site visits to local employers. Similarly to previous results, these finding support the notion that more continuous, more highly cooperative and more time-intensive approaches to professional development may facilitate the preparedness of counselors to participate in Tech Prep.

Results of Tech Prep Professional Development and Preparedness for Role

Respondents were asked to indicate the extent to which they disagreed to agreed with a list of ten possible outcomes of Tech Prep professional development. These responses were correlated with the preparedness for role factors using the Pearson product-moment correlational analysis. A total of 48 significant correlations were found and are described according to each of the six factors, showing primarily moderate to strong relationships among these variables.

Career planner and results of Tech Prep professional development had five significant relationships that supported the theoretical framework of the study. As a result of Tech Prep professional development, counselors were more engaged in working with others, in joint planning, working with business and understand how Tech Prep fits into the overall mission of the institution. These results were integral to being prepared to provide career-oriented information to students.

Preparedness to build internal and external relationships as a result of Tech Prep professional development had nine strong significant correlations. They were more engaged in working with others, clear about what counselors are supposed to do with Tech Prep, involved in joint planning, having more working relationships with people from business, participating in on-going dialogue about Tech Prep, getting and sharing information about articulation agreements, better understanding of how to perform duties, and understanding the relevancy of Tech Prep. All of the outcomes associated with internal and external relationship builder suggested that the results of Tech Prep professional development had significant impact on the perception of roles and responsibilities.

The more counselors were prepared to perform the role of program monitor, the more they felt Tech Prep professional development had engaged them in working with others, working with business, they were clear about what to do, involved in joint planning, had opportunity for on-going dialogue about Tech Prep, better understood how to perform duties, and understood the relevancy of Tech Prep.

The role of communicator had nine strong significant correlations with results of Tech Prep including engaging in working with others, being clear about what to do, involved with joint planning, understanding how it fits into the mission of the institution, participating in on-going dialogue, providing information about articulation agreements, understanding the relevancy of Tech Prep, and working with business.

Curriculum innovator had seven moderately significant relationships. They were: participating in joint planning efforts, becoming more engaged in working with others on Tech Prep activities, working with business, being clear about what to do, understanding the fit into the mission, participating in opportunities for on-going dialogue, and understanding how to perform duties.

Market connector had significant relationships with all of the results of Tech Prep professional development. That is, the more counselors felt they got out of the professional development, the more they saw themselves as market connectors. These strong relationships include: involved in joint planning, understanding how Tech Prep fits into the overall mission of the college, working with others on Tech Prep, being clear about what counselors do related to Tech Prep, working with business, better understanding how to perform duties, and understanding the relevancy of Tech Prep. Note that this role was the only one that had a significant relationship between questioning how to approach students. This suggests that counselors are clear in understanding how to approach students in all other areas.

Implications for Policy and Practice

The findings from this study imply many implications for secondary counselors, community college counselors, local administrators, state administrators, and professional development providers outlined below.

Secondary Counselors:

Respondents to the study reported feeling frustrated with the high number of students they were serving combined with the amount of time it takes to develop individualized career plans. Community college counselors reported addressing this concern through disseminating career information in the classroom. Developing working relationships with teachers to design ways to for counselors to present career-oriented information in the classroom could create new avenues for disseminating information to groups of students instead of meeting with them one-on-one.

While examining Tech Prep professional development of counselors, this study found that over 65% of counselors participated in reading newsletters and brochures about Tech Prep, and slightly less than 50% participated in site visits to local employers, and attended a one-time Tech Prep workshop. Many of these experiences were mandated, suggesting that as an adult learners, participants were not in an environment conducive to learning. Findings from this study suggest that alternative approaches to professional development that consider the learners to be self-directed adults, such as attending a series of Tech Prep workshops, participating in joint planning time, and planning Tech Prep curriculum were better at preparing counselors for Tech Prep roles and responsibilities.

While findings from this study indicated that respondents saw the relevancy of Tech Prep, counselors were frustrated at the lack of direct services to students. Participation in

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the approaches to professional development listed above would perhaps be a better use of resources. Counselors need to request resources to allow for self-directed Tech Prep projects so the direct services such as providing career orientation seminars can be developed and implemented.

Community College Counselors:

Community college respondents indicated their institutions were very supportive of Tech Prep, yet respondents indicated spending an average of 10 minutes per week on Tech Prep activities. This suggests role ambiguity in the area of Tech Prep in that either counselors were conducting Tech Prep activities and were unaware of it, or do now know what to do with Tech Prep. The combined secondary and community college counselor respondents indicated that as a result of Tech Prep professional development, a majority of counselors still did not understand their role. While the perceived institutional support was there, it appears to be unclear as to what role counselors can play in implementing Tech Prep.

According to the respondents, the primary approaches to Tech Prep professional development of counselors was reading newsletters and brochures, participating in local employer site visits and attending a one-time Tech Prep workshop. However, findings suggest these approaches do not better prepare counselors for their roles and responsibilities in Tech Prep. Rather, participation in joint planning time, and curriculum planning were better approaches to preparing counselors for role in Tech Prep.

Respondents also indicated their frustration with the lack of direct services to students and the use of Tech Prep funds. This indicated that it is time for counselors to take initiative in providing direct services to Tech Prep students such as providing career orientation seminars.

Local Administrators

This study and other research (Gysbers & Henderson, 1994) indicates the counselor-to-student ratio is an average of 1:315. It is difficult to imagine that counselors would be able to adequately preform their roles and responsibilities given these ratios. With the increase of problems in society being place on educational institutions, it is only fitting to increase the number of career-oriented counselors to better meet these needs. Counselors expressed a positive view of Tech Prep with concern about their role in implementing it:

> Tech Prep certainly has a place in today's career planning genre. The institution Tech Prep works best are ones that have career/college counselors with no student loads who can concetrate solely on delivering this information to students and parents. Tech Prep to the true generalist counselor, is just another of the tasks he/she must become 'expert' in and generally will not be done with consistency as the counselor tires to prioritize its relevance versus all the other relevant 'stuff' he/she does.

Respondents reported the most common approaches to Tech Prep professional development were reading newsletters and brochures, participating in site visits to local employers and attending a one time Tech Prep workshop. These approaches have assisted counselors in gaining an understanding of the relevancy of Tech Prep, however they were not at all related to counselor preparedness for their role in Tech Prep. Based on the study respondents, a majority of counselors did not feel they had acquired a better understanding of how to perform their duties as a counselor as a result of Tech Prep professional development.

Counselors reported frustration with the use of Tech Prep funds, as illustrated by one respondent who said, "quit using the money to bring in consultants, support administrative positions. Use the money where it is needed at the local school level.. . What happened to direct [student] services?" Findings from this study show that participation in joint planning was highly correlated to preparedness for roles and responsibilties in Tech Prep and that combinations of professional development approaches can be helpful in gaining an understanding of role in Tech Prep. Inclusion of counselors in other approaches to professional development such as joint planning time and curriculum planning teams, study groups, and action research would likely allow for creation of direct student services and perhaps be a better use of resources.

Individual counselor views toward Tech Prep did not appear to be associated with their participation in various types of professional development. However, comments from respondents indicated that Tech Prep professional development was mandated as illustrated by one respondent who attended a mandated workshop, "I feel as do many of the staff, that Tech Prep is being rammed down our throat." As stated earlier in this study, "Adults tend to avoid, resist, and resent situations where they fell they are treated like children--being told what to do and what not to do, being talked down to, or judged. They resist learning under conditions that are incongruent with their self-concept as autonomous individuals" (Knowles,1970,p. 40). It was evident from the respondents that counselors receive little release time for professional development or independent research. Mandated and/or segmented approaches to professional development had negative relationships to preparedness for Tech Prep responsibilities, suggesting that other conditions for professional development of counselors may be more appropriate.

Education-to-Careers Administrators with the Illinois Community College Board and Illinois State Board of Education

This study found that practitioners at the local level have received mixed messages regarding Tech Prep. Through the provision of funds for professional development of counselors, there have been a wide range of approaches taken, from mandated, segmented approaches to on-going, collaborative approaches. Findings suggest that mandating adults to learn is not effective in helping them adopt new roles and responsibilities, particularly if they do not believe the initiative behind the reform effort is stable, as illustrated by the following quote,

> Tech Prep in theory is a wonderful idea--a way to mesh learning and experience, especially work experience. There seems to be lots of resistance from faculty in all areas. Most people I know are waiting for Tech Prep to phase out and the next new initiative to phase in, as so many other ideas have come and gone.

The state structure of separate departments and divisions for managing reform initiatives makes it very difficult for implementation at the local level. The isolated Tech Prep initiative that is uncoordinated with the multiple "academic" reform efforts demonstrate the collaborative approach to educational reform is not occuring at the state level, suggesting it is very unlikely to occur at the local level.

Respondents to this study indicated Tech Prep professional development approaches to date have done little to help them develop working relationships with business representatives. There was concern expressed regarding the use of Tech Prep funds with so few services offered directly to students. Local coordinators need recognize the participants in Tech Prep professional development are adults, who are self-directed, bring experience but need the ability to involve themselves without bias in new experiences, have a readiness to learn if time for reflection is allowed, are problem-centered

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rather than subject centered (they need to know how it will help them on-the-job now) and need to work in environments where it is safe to experiment in new roles.

According to the research findings, a variety of professional development approaches such as joint planning time and curriculum planning teams, study groups, and action research would be most conducive to involving counselors in Tech Prep. Such approaches would likely allow for creation of direct student services and perhaps be a better use of resources.

Recommendations for Future Research

The ex post facto survey design prevented this research from gathering in-depth data about secondary and community college counselors and their roles and responsibilities. A qualitative version of the study of counselor roles would perhaps better portray counselor views, concerns and responsibilities in meeting student needs at the local level. In addition it might help to understand other concerns at the local level such as organizational issues (unions, other reform efforts). In addition, a longitudinal study of the counselor respondents would also provide more in-depth data to examine changes over time.

The survey design provided some insight as to the perception and preparedness for roles and responsibilities in Tech Prep. Expansion of the survey to larger groups of counselors would further support the factors identified in this research. In addition, modification of the survey instrument to examine roles and responsibilities of other key groups would assist in understanding how personal and professional experiences, professional development approaches and perceptions of roles and responsibilities may relate for other groups.

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FROM SCHOOL TO WORK:
Secretaries' and Machinists' Representations of their Occupations

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Introduction

The study of the transition from school to work by vocational high-school students has as a broader context the evolution of vocational training itself. We will therefore begin by outlining the main historical and organizational themes of vocational education and training in Quebec. After introducing the principal elements informing our theoretical research framework and methodological approach,[1] we will submit the results of our analysis of graduates' discussion data. These results are introduced via the students' social and professional characteristics at the beginning of their vocational studies. They are then exposed successively through the representations expressed by the students during their studies — with respect not only to their vocational training and education, but also to their chosen occupation. Thereafter, we will describe the graduates' professional situation one year following completion of their studies, their appreciation of the work situation and apprenticeships pursued. Finally, we will attempt to understand the import of the vocational education experience to students, as well as to articulate a sense of their school-to-work experience. We will also attempt to elucidate the occupational identification process expressed both during the students' vocational education and during the year following their graduation.

The history and organization of vocational education and training in Quebec

The history of vocational education and training is supported by the social and economic development of individual states. In Quebec, the state became involved in the training of young apprentices in 1869, with the creation of Trade Schools granted by the provincial government, local companies and municipal councils. During the first half of the twentieth century, as urbanization continued apace, unionism thrived and the need for qualified labor grew, the provincial government established vocational education and training schools to administer the training of workers and skilled employees. By 1922, many school boards, under pressure from local industries, had established Trade and Art Schools. In 1941, the Government of Quebec founded the Superior Council of Technical Training, tasked with coordinating vocational and technical education, from study programs to examination. The critical shortage of apprentices, in the construction sector in particular, also drove the government to recognize, in 1945, the right of a Joint Commission comprised of worker and employer representatives to administer workers' training. This would mark the beginning of a network of Apprenticeship Centers. Such centers were established in numerous municipalities, and soon became very popular (Commission d'étude sur la formation des adultes, 1982).

In keeping with the mood of widespread reform shared by many industrialized states in the early 1960s, the Government of Quebec — valuing economic rationalization and state planning — set about transforming the province's social, political and educational institutions. 1961 saw the establishment of a Study Committee for Vocational and

Technical Education (Tremblay, 1962) and a Royal Commission on Education (Parent, 1963-1996). The provincial Ministry of Education was created in 1964. In the mid-1960s, the application of recommendations by the Study Committee and the Royal Commission on Education led to a radical transformation of the educational system, greatly affecting vocational education and training. In the interest of democratizing education, Vocational Schools, Technological Institutes and Trade Schools were integrated into the overall school network — prompting the disappearance of the Apprenticeship Centers. This major educational reform conferred on education agents control over vocational education and training, ostensibly to enhance the quality and status of vocational education and training. Disappointment followed in 1972, as educational organizations recognized the mishandling of educational reform — that vocational education and training programs were primarily recruiting students who had failed to succeed in academic education programs. Employer organizations were equally dissatisfied; in 1973, the Employers' Council began issuing reports nearly every year, calling on the Quebec Premier to provide better vocational education and training for students (Charland, 1982).

Under pressure from its critics, the government organized wide-scale consultations on Vocational Education and Training in 1979, soliciting the involvement of education and employment partners. The latter emphasized the chronic shortage of qualified labor and the urgent needs of the industrial sector in the face of the automation of production processes, growing technological change and the globalization of the economy. In the name of polyvalence and workforce flexibility, spokespersons representing the economic sector requested modifications to vocational education curricula. In response, the Ministry of Education proposed an Action Plan (Ministère de l'Éducation, 1986) whose implementation involved changes in vocational education and training, whereby educators and employers would cooperate to review the curricula of vocational programs and the assessment of vocational learning. This action plan also affected vocational teachers, the harmonization of youth and adult vocational education and training, etc. The integration of youths and adults in the same classroom led to a wider disparity in students' ages. Youth and adult vocational educators were also forced to harmonize the delivery of educational activities. This joint effort brought new reforms to vocational education and training (Ministère de l'Éducation, 1987), defining the vocational study program leading up to a diploma (the same program as that in which the students involved in our study were registered). The new program was supplemented by an extension, of one to two years, of academic education prior to the vocational education and training program, as well as by the inclusion of theoretical elements likely to develop problem-solving and learning-transference ability. Thus, the Ministry of Education opted to valorize basic knowledge, such as learning concepts, and technological and scientific principles. In so doing, it placed importance on theoretical knowledge in the structuring of vocational curricula (Hardy & Landreville, 1992).

The continuing rapid evolution of economic and technological sectors, combined with societal concerns regarding the overall quality of education, has since prompted the development of a new Action Plan for the Reform of Education (Ministère de l'Éducation, 1997). The proposed amendments would seek to bring about, among other things, broader access to upgraded vocational education, so as to make adequate levels of education available for a higher proportion of youths. These amendments, when implemented, will further the reform of vocational education and uphold the interests of the action plan of 1987, while at the same time enriching it. The curricular content of vocational programs will remain largely unchanged and the conclusions of our work will therefore retain their currency. Indeed, the programs in which the subjects of our research were enrolled at the time of study are predominant throughout the province's educational institutions and are commensurate with the proposed access changes of 1997's Plan of Action.[2] Accordingly, increased — and increasingly diversified — cooperation can be expected among education and employment partners.

Theoretical Framework

The last decade is characterized by a powerful preoccupation with the quality of workforce training, as far as its ability to comply with workplace requirements. Studies concerned by such issues had as their initial focus the employers' point of view, intending as they did to identify the knowledge and skills required by and for technological advancement (Carnevale, Gainer & Meltzer, 1990). Thereafter, other studies took into consideration the educators' point of view (Stasz, Ramsey & Eden, 1995) and their roles (Schmidt, Finch & Faulkner, 1995). To complement this literature, we investigate the point of view of students enrolled in Vocational High Schools. We adopt a theoretical approach similar to the one used by Banks' team (1992) to study British students aged 16 to 19.

Changes in vocational education requiring the development of cognitive aptitudes are oriented towards problem-solving and the transfer of knowledge, as well as towards the capacity to communicate and adapt to changes in management and production processes as presented by, among others, Hardy & Maroy (1995) and Tanguy (1991b). These changes involve new types of learning, which form the basis of our theoretical framework. First of all, we explore the difficulty in learning implied by this reform of vocational education. Studies by Tanguy (1991a) and Hardy (1994) have clearly demonstrated that students of vocational education programs are less likely to value theoretical knowledge, are more stimulated by production and are not easily interested by diversified knowledge unrelated to concrete accomplishments. Under such circumstances, the matching of students' characteristics with the requirements of the educational system and the labor market becomes one of the major challenges of high-school vocational education, and it justifies the predominant place we give to the valorization of different types of vocational knowledge or studies with respect to the students in our study. Second, we examine the students' transition from school to work. This transition is problematic, given the increasing precariousness of employment and chronic underemployment affecting youths and less qualified individuals, as observed by Gauthier (1994) in the province of Quebec and by Pautler (1994) and Klerman & Karoly (1995) in the United States. How do the students manage their transition from school to work? Are they able to find work in their field?

In order to answer these questions, we opted for a longitudinal study which would follow the students from the beginning of their studies through until the year following their graduation. A cognitive and sociological perspective was adopted (Hardy & Landreville, 1992; 1998). Our study is limited to the social dimension of knowledge acquisition as we were able to observe it -- first, from students' representations of the valorization of vocational knowledge with regard to the skill requirements of the workplace, as well as anticipated or experienced characteristics of the labor market; and, subsequently, from their appreciation of their work situation one year after graduation. The works of Moscovici (1993) -- in which systems of notions and images are combined in a diffuse, yet coherent, network that expands with the process of social interaction -- are used to analyze students' representations. This approach allows us to consider the development of occupational identity during the training period, as analyzed in the workplace by Darrah (1996) and Dubar (1991), as well as during vocational education, as discussed by Hardy, Grossmann & Mingant (1997). In addition, the types and combinations of knowledge and ability which give rise to required competencies is established using the work of Stasz & al. (1995) on Generic Skills, Darrah's (1996) Skill Requirements approach, and the works of Stroobants (1994). We then study the students' transition from school to work.

Methodology

We opted for a qualitative approach centered on interviews with the students. As in the case of Glaser & Strauss (1967), theoretical criteria were used to select the groups for consideration and evaluate them from a case-analysis perspective (Stake, 1995). The choice of student groups for our study was based on four theoretical criteria applied to vocational programs: 1) preparation for an occupation subject to technological change; 2) inclusion of a significant portion of theoretical knowledge; 3) ability of graduates to find a job related to their field of study; and 4) attraction of a clientele comprised of women and men.[3] The application of these criteria resulted in our choice of secretarial and machining programs.[4] In order to better understand our subjects' evolution, we determined to conduct a longitudinal study spanning the entire duration of vocational education as well as the following year, according to four measures: T1) the first session of the studies; T2) half-way through vocational education; T3) the end of vocational studies; and T4) one year following the end of vocational education. Our analysis takes into account these four measures and includes the 28 women and 29 men who participated in all the interviews during their vocational education. This number was reduced to 23 women and 24 men in T4, owing to difficulties in reaching students after they had left school. All the students attended two different Vocational Centers located in the suburbs of the City of Montreal between September 1990 and September 1993, and we reached them after they left school in 1993/94.

The analysis is based on a total of 107 interviews with women taking secretarial studies and 111 interviews with men studying machining.[5] All the interviews were semi-directed and, in T1, examined social and family characteristics, as well as academic and professional experiences. Interviews in T1, T2, T3 and T4 also sought to elicit students' social representations as to: valorized theoretical and practical knowledge, desired skills and aptitudes and chosen occupation. T4 interviews incorporated more information on job-seeking, experiences with employment and unemployment, and professional aspirations. The time allotted for these interviews varied from 60 to 90 minutes in T1, and from 45 to 60 minutes in T2, T3 and T4. All the interviews were recorded, transcribed to computer media and subjected to *qualitative analysis* – in order that we might highlight recurring themes, as well as comments expressing the representations and experiences outlined in the following sections.[6]

Social and occupational characteristics of the students at the beginning of their studies

The fathers of both the women and the men (N=57) share similar occupational and educational levels. The majority of the fathers are blue-collar or white-collar workers and did not pursue a post-secondary education (N=44). The fathers of the women are more likely to have earned a high-school diploma (N=11), whereas the fathers of the men (N=12) are more likely to have pursued a vocational education. The mothers either have occupational and educational levels similar to those of the fathers, or may work as housekeepers. The concentration of women in secretarial studies and of men in machining is the result of a gender polarization of career choices in high-school, which tends to affect working-class students in particular. This would seem to support the conclusions of Valli (1986) as to the importance of gender in students' vocational guidance.

The average age of the secretarial students is 27.7, and ranges from 17 to 49. They can be divided into two equal groups: 17 to 22 years, and 22 to 49 years. The machining students range from 16 to 21 years, and average 18.2 years of age. The age differences correlate with variations in family responsibility and living arrangement. Four-fifths of the women aged 22 years or less, and all of the men, have no children and tend to live with their parents. Almost half of the women have one or more children. A great majority of these mothers are over 22 years and many are single parents. One-third of the women in secretarial studies are distinguished from the men in machining by their status as parents, as well as by their more advanced age. The educational profile of secretarial students is similar, regardless of age. Almost all of the women in secretarial studies and all of the men enrolled in machining received failing grades in language (French) or mathematics prior to completing their high-school studies. The majority of secretarial students hold a high-school diploma and half of them chose secretarial studies after interrupting their post-secondary studies. Incidentally, the vast majority of men in machining identify a career in machining as their first choice and the majority actually began their studies without having completed all the requirements for a high-school diploma.

Studying the students' occupational paths reveals three routes. The first applies to a number of the secretarial students aged 22 years or under, and all of the students in machining. This group works part-time while studying, or full-time during the summer months. The second avenue is shared by 5 women in secretarial studies who have had some experience in the labor market outside of their occupational studies, during which time they received unemployment or social welfare benefits for less than a year. A third path characterizes older women with a rocky occupational history. More than half have lived on social welfare for over two and a half years. All of the students' employment was precarious and demanded few qualifications; a number of them were employed in occupations related to their chosen field. Apart from the length of their occupational paths, the principal difference between these groups is the fact that the single mothers among them must rely on social welfare.

Coming from a working-class background, the majority of students attempted to achieve academic success, ultimately giving way to failure and gravitating towards vocational guidance. A number of the students in secretarial have followed a tortuous academic and occupational path, first attending college, only to return to high school or experience precarious employment and social welfare. The other secretarial students and those in machining have experienced a much smoother route. Despite these differences, all hope to improve their chances of participating in the labor market and enhance their socio-occupational status by pursuing or returning to occupational studies.

Representations of knowledge and skills in occupational studies

To learn about the students' perceptions vis-à-vis the knowledge and skills they must master in their studies, we questioned secretarial and machining students concerning the knowledge, abilities and qualities judged more or less important to acquire, as well as those that they qualify as more or less interesting. Their representations are outlined in terms of valorized or devalorized learning, in Figure 1. We begin with secretarial students, followed by those in Machining.

Knowledge and skills valorized or devalorized by secretarial students

Throughout their studies, the 28 secretarial students place the emphasis on valorized knowledge, as much on the basis of the importance of the knowledge and qualities to be acquired, as on their own interest in the subjects of their study program. However, they are divided when it comes to acquiring 'useless' or less interesting knowledge. For 10 of the students, everything taught in the secretarial program is useful. At the beginning of their studies, almost all of the future secretaries qualify the acquisition of some theoretical knowledge and the familiarization with basic practical skills as essential for their chosen occupation. At the mid-point and at the end of the program, theoretical knowledge is set aside in favor of the skills and behaviors valorized by employers. We will deal here only with the valorized knowledge.

Figure 1
Secretaries' and Machinists' Occupational Knowledge and Skills[7]

Knowledge	Theoretical	French, English, Accounting, etc. Mathematics, Procedural Planning, Trigonometry, Metrology, Drawing, etc.
	Practical Skills	Computer Skills, Typing, Software, etc. Numerical Control, Plan Interpretation, Turning, Countersinking, etc.
Skills	Production Methods	Flexibility, Speed, Precision, Design, Manual Labor, Respect for Safety Procedures, Production, etc.
	Application of Practical Skills	Computer Skills, Typing, Reception Manner, etc. Lathe Operation, Metal Cutting, Countersinking Equipment Operation, etc.
Attitude and behavior	Participation Abilities	Responsibility, Autonomy, Involvement, Resourcefulness, Initiative, Sense of Organization, Punctuality, etc.
	Adaptation Abilities	Patience, Perseverance, Self-Control, Adaptability, Helpfulness, etc.
	Personal Qualities	Discretion, Respect for Others, People Skills, Self-Confidence, Concentration, Positive Attitude, Neatness, Well-Groomed Appearance, etc.

Knowledge: Although only a quarter of the students are interested by French class,[8] almost all emphasize the importance of French language skills as a communication or work tool throughout their studies. *"French class is the most important, the number one thing to learn. You have to be able to write letters. It's depressing to receive a letter with mistakes."* "*Not everyone has good written French. When you look for a job, the first thing they ask you to do, is to write in proper French.*" Moreover, the addition of English language skills become necessary as the student progresses through his or her studies. Incidentally, when they begin their program, many of the secretarial students favor typing, whereas only one student in five chooses to study computer skills. At the end of their studies, the majority of the students valorize familiarity with various software packages. *"Computer class is the most important. All the computer classes are important, particularly word processing." "What I appreciate the most is having a base of computer skills; that gives us a lot of opportunities. Word processing is the foundation.*" They also attest to the importance placed by employers on software ability, when hiring a secretary.

Skills: On the one hand, many students, throughout their vocational studies, emphasize the importance of speed as part of their training. For them, the efficiency and profitability required by employers depend a great deal on the secretaries' being speedy. *"The big thing employers look for is speedwriting. Being able to work quickly and easily. We have to be efficient.*" secretarial students are also attracted by the diversity of activities inherent in their work. *"I chose secretarial work because there's a great variety of things to be done. It's not just typing or word-processing[...]. You have a lot of different things to do in one day.*" On the other hand, an interest in applying practical skills appears at only mid-program. More than a third of the students prefer such activities as typing, computer work or reception duties. By the end of their studies, software skills interest more than half of the students. The speed and enhanced opportunities implied by computer ability are what draw the students to acquire computer skills. Ease of use is also an important factor.

Attitude and behavior: During their schooling, the majority of the secretarial students consider punctuality and a sense of responsibility to be the most important qualities employers look for. Their perceived importance further increases by mid-program. *"A secretary must be able to assume responsibilities. You can't always wait for the boss to do something. Then there's the fact that work has to be done on time, you can never fall behind."* For a third of them, the importance of developing initiative, autonomy and a sense of responsibility must not be overlooked. At the end of their studies, they emphasize perseverance. When it comes to personal qualities, students' representations develop over the course of their studies. At the beginning and at mid-program, the importance of people-interaction skills is emphasized. Towards the end of the program, greater value is attributed to such qualities as discretion and respect for others in enhancing their image for potential employers, or others. *"For a secretary, I think discretion is important. You can't let on what's happening inside the company." "It's often the secretary who deals with the customers and people from the outside. Being polite to everyone is super-important. You have to respect them. The impression you give will reflect on the company."*

Knowledge and skills valorized or devalorized by machining students

The 27 machining students appreciate the range of knowledge and skills covered in their study program; very few of them find certain classes less interesting or useful. What learning is devalorized usually falls into the category of theoretical or practical knowledge. Throughout their schooling, it seems that it is difficult for them to acquire certain types of knowledge and skills; however, it is in precisely those fields that the machinists wish to develop the most knowledge and skills in preparation for their future occupation. From the beginning through until the end of the program, they pay more importance to those knowledge, skills and behaviors that are required of a good machinist – that are required by the employer. As in the case of the secretaries, we will focus on valorized knowledge.

Knowledge: At the beginning of the program, only one-third of the students underline the importance of mathematics, whereas, at mid-program and at the end of the program, more than half of the machinists valorize mathematical success. Mathematics and trigonometry are seen as prerequisites for a machinist. *"Mathematics are very important because they are required everywhere in this occupation. Let's say you're working in your drawing module, you'll need your math -- and when you work in the shop, you'll also need your math." "You have to be good at theory. But if you don't have your math and trigonometry, you're in trouble."* At the end of their studies, more than half of the machinists consider reading plans and numerical control as the most important practical skills to learn. *"Drawing, plan reading and calculus are the basics you have to know well if you're going to be able to create any piece."* They stress the importance that the supervisor accords these skills. They also believe that countersinking and lathework are practical skills which deserve a great deal of attention. *"If you have a good basis in drawing and calculus they'll ask you what you know about lathes and countersinking machines. These are the most important – they're the base for a machinist."*

Skills: Throughout their studies, practical ability is perceived as the most appealing aspect of a machinist's skill, together with manual work, which consists mainly of producing a certain number of pieces and assembling them. Highlighted skills concern methods of production, such as precision, speed and flexibility. *"I think employers look for people who have self-confidence, who can work quickly and with precision. Precision* *defines the quality of your work."* Working quickly and precisely while respecting safety rules are the principal requirements expressed by at least two out of three machinists. *"The most important thing for employers is safety -- wearing boots, protective eyewear and proper clothing."* At the mid-point and at the end of their studies, many students pay particular attention to visualization skills, as designing is such an important part of their work. *"When somebody brings you a piece, you have to imagine it and create it in your mind. There's a lot of preparatory work, but I like being creative."* Nevertheless, the application of practical skills such as working a lathe or a countersinking machine would appear to be of interest to machinists, especially in mid-program. *"The most interesting thing is the countersinking machine, because you can create so many things on it. Then, there's the lathe, because the two go together. Everything that can be done on the lathe can also be done on the countersinking machine, and vice-versa. They're closely related -- the only thing is, you have different set-ups for each piece." "Very often, an employer will ask you if you're familiar with the lathe or countersinking machine. These are the most important things, the basis in machining."* These valorized skills call for technical actions which are useful at all stages of the students' training, and apply to most industries.

Attitude and behavior: From the mid-point until the end of their studies, the machinists value punctuality and resourcefulness. *"I think that employers look for people who have self-confidence and resourcefulness. Not people who come in late and always ask questions. You have to take some risks. Not too much, but you should be a bit daring."* Self-control and patience figure as important adaptation abilities which increase over the course of one's studies. One student out of two rejects impatience and haste at work. *"What will me a good machinist is patience. You mustn't botch pieces because you want to go too fast. Employers won't accept that."* Concentration and a positive attitude towards others are also cited. *"To be a good machinist you must be calm. You must respect the equipment and your colleagues. A good machinist is someone who concentrates on his work and doesn't disturb his co-workers."* In the students' opinion, employers do not tolerate employees who are absentminded or complaining, or who break pieces or tools because of a lack of concentration.

Students' representations of their chosen occupation

The secretarial and machining students' representations of their chosen occupations arise from their own responses to questions of opinion, as well as their friends' and relatives' opinions regarding the students' chosen occupation. Our analysis of the discussions is intended to bring out those aspects judged to be positive or negative in both occupations. The students describe their representations of the work environment and social perceptions of their occupation.

Representations of the work environment

Secretarial and machining students express their perceptions of the work environment through reference to: 1) the characteristics of the workplace (location, size, field of activity); 2) working conditions (salary, environment, schedule, workload); 3) labor relations with the employer, the public or colleagues. At the beginning of their studies, the secretarial students have a positive perception of the working conditions and human relationships likely to prevail in their future workplace, whereas from the mid-point until the end of their studies they become pessimistic. Incidentally, machining students react as do secretarial students to their working conditions, but human relationships are of lesser concern.

Characteristics of the workplace: Students of both vocational profiles are interested by the geographic location of a given company, and they wish to work in the Montreal area. The secretarial students are more restrictive and want a job in the city where they live, close to their parents and friends. *"Obviously, I live in Laval [close to Montreal], my family lives in Laval. I would like to work in Laval or Montreal. I don't want to move."* At the mid-point and at the end of their studies, two out of three secretarial students hope to work for a large communications company or a government agency, because of the social benefits and possibilities for promotion. *"There's always the possibility of being promoted in a big company. Everybody knows you can get promoted more easily."* Other secretaries prefer a small or medium-sized company where they could grow (*"...in a small company the duties are varied."*) and enjoy friendly relationships with their colleagues. They would therefore prefer to work in a law office or medical clinic. Conversely, the majority of the machinists would prefer to work in a small or medium-sized company where the work is varied. *"I want to work for a small machine shop [...] it's more diversified and you learn a lot."* A third of the machinists would like to work in the aerospace industry, which is highly developed in the Montreal area. Machining students' negative perception of big companies stems from a fear of being confined to mass production, which implies boredom and routine. *"What would pleases me least is being on a production line[...]. They always make the same piece, five days a week, before alternating."*

Working conditions: At the beginning of their studies, the secretarial and machining students maintain a very positive representation of their expected working conditions. Approximately half of the secretaries and 10 of the machinists are attracted by work environment, salary and work schedule. According to the secretarial students, *"It's a matter of being able to work at set hours and without too much pressure. That's how I see a secretary's job[...] There shouldn't be too much pressure, not like in my last job." "But at least I'll earn a better living. And then I've found there are advantages concerning the hours..."* The Machinists offer the following: *"You don't work outside during the winter. Also, your salary tends to be higher when the economy is growing rapidly." "We can't complain about the work areas. They're supposed to be well ventilated and well lit."* By mid-program, more and more of the students can identify the negative aspects of working conditions, especially as regards salary. Secretary: *"This skill is generally underpaid."* Machinist: *I'm a bit skeptical – where salaries are concerned, people think too high, they haven't been well informed."* The machinists cite environmental noise and dirtiness. *"When you work with cast iron, there's always dust [...] so for sure your lungs pick it all up. You're constantly working with oil, you're all dirty [...] you breathe oil. There are a whole lot of things which aren't so great on the medical front."* Both groups of students regret the stress and pressure, combined with the amount of work which can be assigned, and its scheduling. *"It's too stressful. Too much work for the salary. Employers are strict with their secretaries. You have to do everything all at once, without making mistakes."* Machinist: "*The disadvantage is that you always have to aim for perfection. It's difficult because of the stress. The boss is behind you and you can't compromise the piece, even by a tiny bit."* The contrast in students' comments at the beginning of their studies and after the mid-point is remarkable, and it demonstrates a significant disillusionment with regard to their initial expectations.

Human interaction: Only the secretarial students are concerned with working relationships. At the beginning of their studies, they appreciate being in contact with the public. *"Working with people, communicating — I like to have contact with people." "Welcoming the clientele; I like working with the customers."* During their studies, these students' interest in developing relationships with the public is accompanied by an increasing interest in enjoying a positive relationship with the employer. They stress the importance of an egalitarian relationship, based on respect for their competency and their willingness to assume responsibility. *"Secretaries have more to do than in the past. They* *have more responsibilities. You're your employer's right hand."* At the same time, they are skeptical of the reality. *"The least appealing are the employers, it's true that they're sometimes very demanding..." "I wouldn't want to work for an employer who always asks you to perform the same tasks without giving you any opportunity to take initiative."* These fears provide a counterpoint for the students' positive expectations. The wistful perceptions they hold at the beginning of their studies are later tinged with doubts concerning their relationship with a potential employer.

Social perception of their occupation

The students' social perception of their occupation is defined, on one hand, by its general societal value — the personal development possibilities and societal prestige of secretarial or machining positions. On the other, their perception is defined by the socioeconomic status and mobility which they might expect from opportunities and promotions available on the labor market.

Social valorization: Both the secretarial and machining students demonstrate increasing interest in the societal valorization of their occupation; by the end of their studies, this interest unites the two groups. The secretarial students are focused on acquiring core competencies — they are seeking a sound education and training in preparation for a secretarial position. *"The occupation requires a higher knowledge level. Secretarial jobs are more advanced now." "Yes, it is a valuable occupation requiring a sound education and training."* The machining students, for their part, point out the status a machinist enjoys in society as an essential worker. *"If there were no machinists, we'd be unable to enjoy a lot of things — cars, for example — anything that has been manufactured has been machined [...] the telephone was made from a mold, and that mold was created by a machinist [...] What about doctors? How is their equipment manufactured? The scalpel was created by a machinist."* On the other hand, when the secretarial students note the disadvantages of their occupation, they bemoan the persistence of negative opinions and stereotypes. *"It's not recognized because people have no idea about the secretarial occupation, about what goes on in an office. Secretarial school is always the last option. The occupation is too closely identified with women."* Similarly, many machining students consider that the occupation of machinist is often poorly understood by their friends, and even by their own family. *"They don't exactly know what your work means — you have to explain it: that once the plan is finalized, someone has to produce the piece accordingly, and that you operate the machine that produces the piece. Sometimes, they get lost and don't understand, even after you've explained it."* The machining students note, however, that after repeated explanations, society's (mis)representation can change. *"Most people now have a good idea of the machinist's job. They admit that it's an occupation that requires a lot of [...]. Some say it requires thinking all the time while you work."* Even if it is the case that the secretarial students feel valorized in their chosen occupational field, they are nonetheless all aware of the various deprecatory perceptions held by society. In the end, the machining students attest to a better understanding on the part of their friends and relatives.

Socioeconomic situation and social mobility: Students in both occupational groups refer only to the positive aspects of their socioeconomic situation and social mobility, ignoring any discourse about recessions or lack of employment. They consider their occupation valuable by virtue of the numerous and varied employment opportunities available: "*...there are a lot of opportunities in the secretarial field, so your chances of finding a job fast are good." "It's a good trade (machinist) and there are lots of job openings — because it's an occupation that has a future that'll last forever."* The majority believe that, given a chance, they will be able to develop their skills and rise to the top of the company, through their own effort and through complementary training. "*...There's a* *lot of opportunity for promotion [...] my wish isn't to be just a secretary. I'd like to take a stenography course, so I could work for the court, as a more professional secretary."* Machinist: "*what I find interesting is the possibility for advancement, the opportunities to learn and keep yourself in shape mentally."* The older secretarial students, however, emphasize stability. "*I often say I'm afraid because nowadays jobs are so hard to find. But when it comes right down to it, they can't do away with secretaries."* As for those who attended College, they consider secretarial work as a springboard to a different career. *"I don't want to be a secretary all my life, I want to charge in and go further in life."* The machinists believe that continuous professional development will eventually allow them to become self-employed workers and start their own business. "*It's an occupation where, if you settle down properly, you could go a long way. You can do anything — it's an occupation with a future."*

Professional situation one year after ending studies

We will first present the professional situation of all the graduates we interviewed, then we will describe in greater detail the role and initiation of those who are working in their own field.

Graduates' professional situation: One year after completing their studies, 23 secretarial and 24 machining graduates were contacted. Fifteen former secretarial students were employed, six were unemployed and two were pursuing their studies — one in College, the other at University. As for the machining graduates, fifteen were working, two were unemployed and the other seven had returned to school. The majority of them had specialized in tooling or numerical control tooling machines, or had decided to extend their occupational training by studying industrial mechanical maintenance; two had returned to college. Two-thirds of the secretaries (N=10) were still working in their first job, whereas another third (N=5) were working in a second job, after leaving a temporary job unrelated to secretarial studies. Since completing their studies, half of the unemployed secretaries (N=3) had not worked at all, and the other half (N=3) had held one or two jobs lasting 5 months or less. About half of the employed machinists were working in their first job (n=8); the other half in their second, or more (N=7). Since they left school, all the unemployed machinists had worked to some extent. Precariousness of employment was more in evidence among the machinists, but more secretaries were outside the labor market. The majority of secretaries (N=10) and machinists (N=14) found their first job during the first month after completing their studies. Five secretaries and two machinists required two months or more to secure their first job. All the secretaries (N=15) held a job related to their studies, whereas only nine machinists worked in the occupation they had studied for. Six of their colleagues worked in handling, shipping, printing, maintenance, etc., where no special training is required.

Working in the chosen occupation and initiation to work: The working secretaries are employed by private lawyers, opticians or dentists (N=6), in the fields of business or real estate (N=5), or by telecommunication companies or health or social services agencies (N=4). Working on computers, using software, preparing documents, welcoming customers, administering the mail and answering telephone calls are the most usual duties. Some also perform accounting functions. As for the machinists, nine work for small companies, or 'machine shops'. Their main duties involve turning, countersinking or precision grinding, using conventional machines or numerical control tooling machines. Some manufacture pieces in limited quantity, while others mass-produce. Initiation for both the secretaries and the machinists is gradual and informal. After the nature of the work has been explained, the initiation is conducted under the supervision of highly experienced employees, who provide explanations as requested, while the new employees go about their duties. The majority of the secretaries and machinists benefit from supervised training lasting from a few days to three weeks. Moreover, some machinists have the opportunity to work with a mentor, to whom they become an apprentice; this type of training is longer in duration. In the main, the secretaries and machinists are satisfied with their initiation, they appreciate the approach taken by their supervisors, and emphasize the importance of being initiated into their role, and becoming resourceful. Only a small number of secretaries complain about pressure from, and the intolerance of, their supervisors.

Appreciation of the work situation and ongoing learning

We examine the assessments made by the secretaries and machinists of their jobs, with respect to working conditions and relationships, as well as their own interest in and appreciation for their work, in comparison with prior representations. We then consider their ongoing learning and professional aspirations.

Work relationships: The secretaries and machinists appreciate their relationships with their supervisors, citing good communication, respect, honesty, adaptability, a sense of humor and patience. Secretary: "*It's easy to communicate with him* [...] *You can hardly notice when something's wrong.*" "*She's very accommodating — if you need something, she's always there to help and doesn't stress you out.*" Machinist: "*Communication. He tells me when something's wrong. I like it that way.*" "*Whenever I make a mistake I'm always afraid to be told 'we no longer need you' — instead, he says: 'how did this mistake happen, do you know why? If you don't know why, I think I do and I'll tell you,' and then we talk...*" The graduates appreciate hearing their supervisor's opinion as to how they could improve their skills and better fulfill their job requirements. They emphasize the importance of their supervisor's teaching abilities. Some complain about his or her character or poor communication skills. Most judge their relationships with their colleagues to be very positive. Teamwork and cooperation amongst co-workers are very important aspects for both the secretaries and the machinists. Their definition of a pleasant working atmosphere is: communication, humor, reduced competition and minimal stress. "*What I find most stimulating is the fact that we're a team and that we complement each other. We all lend each other a hand [...] There's no jealousy. In a big office, it's usually more competitive, but not here.*" "*They're very nice to me — seriously, you can ask them any question about work and they'll answer you [...] they'll do anything to help you, they're really wonderful.*" Both the secretaries and the machinists also appreciate the family atmosphere of their respective companies. They regret occasional instances of hypocrisy, indiscretion or lack of cooperation on the part of certain colleagues.

Working conditions: Both the secretaries and the machinists complain about low salaries. By way of explanation, they cite the economic context and their own lack of experience. "*Sure, the salaries are low, but it's the same everywhere — and there's no more work anywhere else. So to acquire experience I have to stay here.*" "*I'm waiting [...] I'm staying here to gain experience. Once I have some, I'll go elsewhere.*" The machinists work from 40 to 50 hours per week, which they regret. "*Well, the hours worked, together with the traveling, they make for long days [...] but you expect that, when you first start out — once you've been working a while, you have more spare time.*" The secretaries particularly appreciate the flexibility of their work schedule, the advantage of living close to their work, their varied duties and the lack of pressure. "*Here, I come in and finish at the time I want [...] I'm responsible for everything, there's nobody to tell me: 'do this' or 'don't do that'.*" "*I'm satisfied because it's close to home.*" "*It's stimulating to work there. There's no pressure.*" They negatively cite overwork resulting from bad planning or personnel shortages. "*The boss dreams up a lot of projects without planning in advance — every day, practically, so at some point you end up having to work late or on weekends.*

Better planning would help." "I have a lot of work [...] since I'm really working for two." The machinists especially note certain unpleasant aspects of their work, as regards their physical environment and the physical effort required of them. "*Always working in the dust [...] the heat [...] creates a lot of discomfort — you're not always working with the proper material." "It's dirty work." "The equipment isn't pneumatic or hydraulic, it's manual — so it's very tiresome.*

Interest in the work: In general, the secretaries and machinists are interested by their respective work functions. While a minority of the secretaries dislike working with the English versions of certain software programs, or have difficulty with spelling, and while some of the machinists dislike working on machines with which they are not familiar and which they must learn quickly, they are nonetheless aware that these difficulties are due to an insufficient mastery of required skills. The secretaries are proud of the quality of the work they have achieved, and appreciate having responsibilities. "*The best thing is creating files daily. You start from scratch, all by yourself, and when it's finished, it's amazing. The company's pleased [...] with the work you've done.*" The machinists emphasize the valorization associated with turning raw material into a piece that respects very precise and strict standards. *"It's great, you pick something raw and turn it into something truly impressive." "When the piece comes along, I produce it — I produce it successfully and then I'm proud of myself. I say to myself, 'why were you afraid?' 'It's passed inspection and now it's gone."* They are proud of having produced a piece which will be used in assembling a useful article. Both groups enjoy diversified work. *"It's not routine work — we never know what will happen from one day to the next." "Well, it's a small shop, you have to wear a lot of hats. You never see the same pieces twice — that's what's so interesting."*

Representation of the work: The majority of the secretaries and machinists note that their work experience has done little to alter their prior perceptions of the occupation. Some had already had exposure to the occupation through family members, while others had developed their perceptions while studying. Those who admit having modified their representation of the work emphasize the transition from theory to practice, real-life requirements, and the stress associated with the job. *"It's different because it used to be theoretical and now it's practical. Working in an office is something else [...] You have to perform." "You can't make mistakes because of the serious consequences." "Well, in school, there's no stress, but here it's not the same. I guess I had an idea [...] but I never thought it would be this stressful."* With only a few exceptions, the secretaries and machinists reaffirm their choice of their occupation and express continued interest in the work.

Learning at work: The secretaries and machinists are satisfied and even enthusiastic as to the degree of learning they have accomplished during the first year of work. They feel it is essential to have a job in which they can acquire work experience and improve their chances of employment. The secretaries relate their satisfaction to their feeling of work being well performed. *"I'm fast enough not to fall behind, and the quality of my work is good."* They are conscious of the effect their learning has on their work, as well as of their adaptability to their workplace. *"What I've learned has helped me to perform better in my workplace." "I'm doing a good job, and that gets noticed, so that's fine."* Moreover, the secretaries have developed skills to fulfill a full range of occupational tasks; they feel at ease in their role. The machinists relate their satisfaction mainly to improved knowledge and expertise. *"Yes, because there, the pieces are produced on time, with adequate precision. I'm aware that I make mistakes but, most of the time, I get the job done on time."* They are proud of the efficiency and precision they have developed, and of the experience they have acquired in the machinist's occupation. *"Everyday, I acquire more experience. If I left my job tomorrow to go and work somewhere else, it wouldn't be the same as when I started* *here; I didn't know anything and I had trouble. Now, I have a good base. Every day, I learn something new."* Thus, they feel the learning they acquire will eventually allow them to search for another job and overcome the lack of experience with which they are so often forced to contend.

Professional aspirations: When it comes to the desired focus of their work, secretaries cite computer-related work, while machinists would like to advance in numerical control or a closely related field, such as tooling and mechanics. *"Do a little bit of everything, work with different kinds of software." "I'd like a job with [...] more computer work." "I always wanted to be in numerical control [...] the machine is closed off [...] there's no dust. You just do your work." "I'd like to be a toolmaker in a good company or, maybe later, self-employed."* The secretaries and machinists hope to advance professionally, acquire more responsibilities and secure an increased salary. *"To get another job [...] become a #6 clerk — right now I'm a #5 clerk." "...in the future, a real promotion." "I'm giving myself 3 months and then I'll get promoted. It's because I get involved and my bosses are happy with my work." "I'll ask him (my boss) to assess my work [...] I'll explain why I want an increase." "Well, maybe not right now because I just had an increase, but possibly next year, my wage will go up another dollar or two." "I'll ask for an increase — this is nonsense."* As for planned training, secretaries emphasize the importance of acquiring improved English and computer skills, in order to become more flexible. *"I plan to take English classes [...] to improve myself [...] You have to develop at the same speed as the software."* The same is also true for machinists, who are considering taking additional specialization classes. *"In September, I'll register in an evening class in numerical control — computer design and numerical control seems like a good combination." "I'd like to purchase the company — I'm interested in taking courses on business management, accounting, stuff like that. It could help me."* Nearly half of the younger secretaries intend to pursue studies at college or university. *"Take an accounting class to qualify for something better at university or college." "Not do the same thing all my life." "Probably in management. To earn a college diploma [...] starting right now." "I could increase my knowledge in something else [...] I'd like to become a businesswoman."* The secretaries note that their vocational studies provided them with an opportunity to begin earning a living quickly, thereby freeing them up to pursue further studies or prepare for another career. The machinists are equally aware of the need to constantly increase their knowledge.

Conclusion

This study is unique for its focus on the perceptions of students involved in high school vocational studies, as well as for its longitudinal approach, which allows us to compare the development of students throughout their studies and their first year on the labor market. We will try to understand, through comparison, what meaning the experience of learning and entering the job market holds for these students, and examine certain elements of their occupational identification process. First, we demonstrate the development of knowledge and skill representations during the study process by identifying consistencies and changes in the valorization of knowledge and skills in the secretarial and machining students we interviewed. Second, we highlight the differences and similarities between their representation of the chosen occupation during their studies and the professional situation experienced one year after leaving school. Thus, we put the emphasis on the transition from school to work. Finally, we specify some of the limits of this study and introduce some works in progress designed to increase its potential impact.

Consistencies and changes in the valorization of knowledge and skills

Consistencies in the valorization of knowledge: Both the secretarial and the machining students consistently emphasize the importance and appeal of acquiring key knowledge and skills, despite the effort required to master them. Very few classes are judged useless. They all privilege the speed and flexibility appreciated by employers. They also emphasize punctuality. During their studies, this consistency differs within each group of students. The women in secretarial studies concentrate on perfecting their French, and on developing skills that will ensure their efficiency and profitability, and demonstrate a sense of responsibility to their future employer. The men studying machining express a preference for manual abilities, focusing on precision, respect for the workplace safety and the application of such practical skills as working on lathes or countersinking machines. In valorizing resourcefulness, they express the importance of team participation.

Changes occurring during studies: Within the two groups of students, changes occur with respect to the importance of developing or applying practical skills and the valorization of personal qualities and adaptation abilities in the workplace. In the secretarial group, this is expressed by a general attraction for everything related to computers and software, and by the increasing importance given to discretion, respect for others, good grooming and perseverance. The secretarial students most valorize such abilities as initiative, autonomy and a sense of organization. They also valorize English language skills; however, their prioritization of theoretical knowledge in general lessens over the course of their studies. The machining students put the emphasis on numerical control and reading plans; they become increasingly sensitive to the importance of concentration and maintaining a positive attitude towards others, as well as patience and self-control. Mathematics is the focus of their theoretical learning.

Changes brought about by reforms to vocational training which favor fundamental learning, transfer-generation and problem-solving do not entail any noticeable obstacles to the appropriation of theoretical knowledge. However, the students' increasing interest in skills acquisition and personal behavior towards the end of their studies would appear to indicate a lack of awareness as to the role of theoretical knowledge in employment outcomes. Such lack of awareness may indicate a form of resistance to theoretical knowledge, which would support the findings of certain analyses conducted by McLaren (1989). This underlying resistance may, over the medium- or longer-term, compromise the development of cognitive aptitudes and the students' problem-solving ability, as well as their adaptability to technological changes in their respective occupations. The consistency in the valorization of different types of knowledge and skills throughout the study program suggests that the occupational identification process had already begun at the time of enrollment. Moreover, the changes which occurred during their studies reveal the students' increasing confidence in performing duties related to their occupation, their desire to match their personal development with company expectations, and their determination to acquire the competencies required for favorable recognition in their future workplace.

Representations of the occupation during studies and one year later

Throughout their studies, the students expressed their various positive and negative perceptions of their prospective occupation. One year after finishing school, they described their professional situation and formulated new representations based on the main aspects of their occupation experience. In order to reveal the differences and similarities noted during those two periods, we compare the perceptions and realities experienced by secretarial and machining graduates. These comparisons help us to understand the transition from school to work for both occupational groups of students.

Differences between the two periods: The differences noted relate mostly to workplace characteristics. During their studies, secretarial and machining students emphasize the opportunities in their occupational field, and ignore the lack of employment. One year after completing their studies, two-thirds of the secretaries and machinists are gainfully employed. As for the other third, most of the machinists have returned to school, whereas the majority of the secretaries are unemployed. However, while all of the employed secretaries are working in their field, only 60% of the working machining graduates have a job related to their studies. Moreover, even if a majority of workers find work within a month of completing their studies, many machinists will be searching for another job within the first year. The comfortable optimism fueled by an apparent abundance of opportunities in their occupational field gives way, after a year on the labor market, to the experience of precarious employment for many of the machinists, and-out unemployment for one in four of the secretaries. The subjects' testimonials reveal a desire to gain professional experience of value in applying for another job offering better working conditions. If we consider only those working in their chosen field, we note that the secretaries are likely to revise their position as regards the size of company they would like to work for. During their studies, two out of three students wish to work for a big company, whereas one third would prefer a smaller one. One year after completing their studies, the opposite is the case. Similarly, the machining students, who have little to say about working conditions during their studies, become much more vocal after acquiring some work experience. As in the case of the secretaries, they appreciate a relationship with their supervisor that is based on communication, patience and respect. They point to the advantages of a collaborative spirit and collegial teamwork.

Similarities between the two periods: The similarities between comments gathered during the program and those gleaned a year following completion concern both workplace characteristics and the subjects' appreciation of their employment situation. With regard to the workplace, all the machining students working in their field are, as expected, employed by small companies, and the majority of the secretarial students are indeed happy to be working close to home. Regarding working conditions, many of the negative expectations developed during the second half of their study program are confirmed in the workplace. In secretarial and machining occupations, these perceptions centre on low salaries, work under pressure, and stress caused by the quality and quantity of work required. Machinists must deal with the dirt and noise which they feared while studying. Notably, a minority of secretaries continue to appreciate the lack of excessive stress in their work. Only the secretarial students demonstrated any preoccupation with working relationships during their studies — post graduation, their hopes were satisfied and even exceeded. They appreciate a relationship with their supervisor that is based on communication, a respect for their secretarial competencies, and ongoing opportunities to prove their sense of responsibility. They also appreciate their colleagues' team work and cooperation.

Societal perceptions cited by the students are in line with the social valorization constructs expressed during their studies. The secretaries and machinists are proud to benefit from diversified work in which they can strengthen their occupational skills and earn the respect of their colleagues. The learning they undergo during their first year of work reflects the knowledge and skill valorized at the end of their studies. Thus, they place emphasis on improving their abilities in such areas as precision and speed, and focus on their adaptability to the work environment. Their professional aspirations are consistent with previous social mobility constructs. The confidence they acquire through learning stimulates many to pursue further education and training, in order to increase their flexibility and improve their promotion possibilities. Five of the machining students decided to delay their entrance into the labor market in order to complete their education in sectors related to machining; almost half of the younger employed secretaries are considering returning to college or university studies.

The students' transition from school to work occurs through a progressive modification, over the course their studies, of various professional aspirations relating primarily to working conditions. The inability of some of the secretaries to secure employment, as well as the movement of many of the machinists towards work outside of their field and the precarious employment situation of some others illustrates the fragility of the school-to-work transition for these two groups of students.

Our analysis of the representations of students working in their chosen occupation suggests that the secretaries and machinists pursue the development of their professional identity in the same way as they go about prioritizing knowledge categories. The various aspects of their appreciation of work situations and continuous learning speak to their interest in professional development, their involvement in their work and their desire for professional improvement.

Limitations and works in progress

This study has two limitations. First, the qualitative and longitudinal format led us to study only two occupational profiles and a relatively restricted number of individuals. Ideally, this study should be repeated with a greater number of students involved in other occupational programs. Furthermore, this analysis was restricted to those who succeeded in their transition from school to work by securing employment in their chosen field. This would tend to provide us with a relatively optimistic view of the situation. Analysis of other students' experiences is rendered problematic by the diversity of employment and unemployment experiences. This heterogeneity prevents the grouping of subjects and leads to a study of individual paths. Nevertheless, the difficulty and chanciness of these graduates' situation is critical to a full to a understanding of the school-to-work transition experienced by vocational training graduates.

We are eager to disseminate our analyses and submit them to educational practitioners and other interested parties for discussion. In 1998, we will publish a book intended for educators, career counselors, students and parents. This publication is being developed under the supervision of a reading committee comprised of three secretarial and machining teachers, one representative of the province's largest teachers' union, one representative of the Quebec Society for Labor Development, and an Editor. We look forward to providing a useful tool for those who work with students, as well as for students themselves, as they pursue their vocational training and prepare to enter the labor force.

Notes

[1] This research has benefitted from the support of the Social Sciences and Human Resources Council of Canada (SSHRC), under its Strategic Research program. It has also been supported by the FCAR (researcher training and research assistance) Fund's Assistance Program.

[2] These paths have been in place on an experimental basis since 1995 (Ministère de l'Éducation, 1995).

[3] In order to respect the first two criteria, it was necessary to adopt different profiles for men and women. Study programs that welcome a mixed clientele, such as Sales and Catering, were not taken into consideration because of the lesser proportion of theoretical knowledge in their curriculum.

[4] In the secretarial program, which lasts 1,450 hours, the group of women studied from September 1990 until May 1992. The machining program lasts 1,800 hours and the group

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of men pursued their studies from September 1990 until September 1993.

[5] These interviews were conducted with the cooperation of the following research assistants: Renée Barbeau, Alain Charlebois, Lyne Drapeau, Sophie Grossmann, Daniel Maher, Anne Mingant and Sylvie Varin.

[6] The coding, processing and qualitative analysis of this information was carried out by the following research assistants: Thierno Bah, Abdoulaye Barry, Pascale Gingras, Sophie Grossmann, Anne Mingant and Sylvie Varin.

[7] The knowledge, skills and qualities identified in Figure 1 are not exhaustive and contain mainly those gathered from interviews with students.

[8] In Quebec, French is the official language, spoken by approximately 80% of the population. It is also the official language of business, and of commercial and industrial advertising.

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Vocational Student Success in Distance Education Courses

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Introduction

Distance education is an emerging technology intended to deliver both resident and remote site instruction and educators who use distance education must provide educational experiences that will equal resident education in terms of quality and quantity. Both resident and distance education are intended to provide students with valid, useful information that promotes learning. Resident, or host site, education occurs when the instructor and students meet at a predetermined location, thus providing easy face-to-face interaction. Distance, or remote site, education has been accepted as teaching when the instructor and students are physically separated in terms of location and/or time. The instructor can be in different buildings, cities, counties, states, or even countries. According to Swan and Brehmer (1994), distance education refers to "the simultaneous delivery of instruction from a host site or classroom to remote site(s), coupled with real time live audio and real time live video interaction between teacher and student(s) – not correspondence, video, or internet courses."

Swan (1995) noted that advancements in communications technology have dissolved some of the major distinguishable characteristics between distance education and traditional education. According to Swan and Jackman (1996), strategies of teaching at a distance and host site are converging because traditional teaching strategies are being abandoned or modified in favor of a problem-based, resource-based, or activity based approach that de-emphasizes the teacher as the main source of knowledge. In 1990, Moore and Thompson analyzed resident and distance education and developed a framework for determining the relationship between the two methods or strategies of instructional delivery. They noted that developing technology will eventually merge distance education with the traditional approach so that distinctions cannot be made between the two methods of strategies. However, Kelly (1990) indicated that the transition from resident instruction in the traditional classroom to distance education requires educators to develop new skills in instructional strategies, methods of teaching, timing, teacher/student interaction, feedback, printed supplement materials, and evaluation.

Souder (1993) compared distance learners and traditional host site learners. The distance education learners performed better than the host site learners on several dimensions, including exams and homework assignments. This finding was attributed to the extraordinary commitment, higher maturity level, and motivation of the distance learner.

However, this finding is contrary to other evidence that distance learners are at a disadvantage in their learning experience, especially evaluation of their cognitive performance (Moore and Thompson, 1990).

The increasing availability of telecommunications has provided vocational or applied education faculty with unique opportunities to plan and deliver distance education courses and programs. Vocational education students are also enrolling in more distance courses and programs due to availability, time, and place. However, there is a lack of studies that compare the performance of vocational education students receiving instruction via distance technology versus students receiving the same instruction through the traditional resident, host site, classroom setting.

Purpose/Objectives

The purpose of the study was to ascertain if student achievement differences existed in courses delivered via distance education. Specific research objectives were:

1. Describe student's enrolled, remote site and host site, in distance education courses on selected demographic characteristics

2. Ascertain if differences existed between remote site and host site student achievement based on grades/scores (GPA) obtained by grade level.

3. Ascertain if differences existed between remote site and host site student achievement (final grade received) based on individual course success.

Methodology

Population

The population of remote site and host site schools was identified from an alphabetical list of secondary schools utilizing distance education technologies supplied by the State Department of Pubic Instruction. The schools were all located within one midwestern state. Each of the identified schools administration were asked to participate in the study. From the total list of schools using distance education, a total population of schools willing to participate were identified, N = 46 schools. From this revised list of schools, a study sample was selected using appropriate cluster sampling methods outlined by Wiersma (1995).

As each school was selected, all courses/classes being offered via distance education from that school were selected for this study. Each student in the study, n = 623, was enrolled in at least one course being offered via distance education. To retain the confidentiality of the student, administrators or the assigned school representative was asked to assign an identification number to each student. This number was used to report all data concerning that student. The researcher did not know or have knowledge of any student name, only their assigned number.

Instrumentation / Data Collection

The study instrument, adapted from the Souder study (1993), was completed from student's records by the administration or assigned school representative. The instrument was assessed for content and face validity by graduate students, teacher educators, and state supervisors in vocational education. Reliability of the instrument was .89 (Cronbach's alpha coefficient). They were asked to report gender, grade level of student, period(s) taking distance education courses, name(s) of specific distance education course(s), location of student (remote or host site), total daily assignment scores, exams and/or quiz scores, and final exam score. All grades reported were based on or converted to a 0 to 100 point system. If conversions were made they were made by the administration or assigned school representative using a scale provided by the researcher. This grading scale was one recommended by the state superintendents and principals association.

Data Analysis

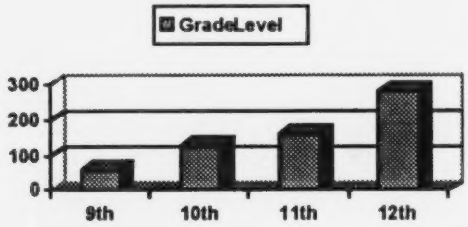
Data were analyzed using the Statistical Package for the Social Sciences (SPSS Version 6.1) for Windows. Data were summarized using descriptive statistics. Frequencies, percentages, means and standard deviations were utilized to analyze and describe findings. One way analysis of variance was used to analyze differences between the grade levels of students, the location of student, and gender. All tests were run at the .05 alpha level.

Results

Objective 1: Demographic Characteristics

Demographically, students in the study were predominately located at remote sites, 68.1% (424), and 31.9% at host sites (199). In the study, there were 245 male students (39.3%) and 378 female students (60.7%). The study identified ten individual courses being offered via distance education, one course was eliminated from the study because no scores were made available to the researcher. Table 1 identifies the total number of students by grade level, 9th = 56 (9%), 10th = 126 (20.2%), 11th = 161 (25.9%), and 12th = 280 (44.9%).

Table 1
Grade Level of all Students



As shown in Table 2, the study group is divided into groups identified by specific course name and by location receiving the course. Frequencies and percentages are used to identify students enrolled in distance education courses all sites in the study.

Table 2
Individual Course Enrollment Frequencies and Percentages

Course Name	All Sites		Host Site		Remote Site	
	N	%	N	%	N	%
Foreign Language	231	37.1	91	39.4	140	60.6
Ag Business Mgt.	77	12.4	3	3.9	74	96.1
Vocational Marketing	21	3.4	14	66.7	7	33.3
Natural Resources	42	6.8	4	9.5	38	90.5
Math - Calculus	119	19.1	63	52.9	56	47.1
Chemistry	70	11.2	9	12.9	61	87.1
Art	14	2.2	5	35.7	9	64.3
Statistics	14	2.2	6	42.9	8	57.1
Animal Science	35	5.6	4	11.4	31	88.6
Total	623	100	199	31.9	424	68.1

Objective 2

One way analysis of variance was used to test if differences in student achievement existed between remote and host site students based on mean GPA. No significant differences were found.

Table 3 identifies the mean Grade Point Average (GPA) of students located at remote sites and at host sites. The grade point averages of students enrolled in distance education courses at both the remote and host sites were very similar.

Table 3
Grade Point Average According to Location Receiving Course

Location	N	GPA	SD
Remote Site	424	3.19	.76
Host Site	199	3.14	.84
Total All Sites	623	3.18	.78

ANOVA was used to test if differences in student achievement existed between grade levels based on mean GPA. There were significant differences among the four groups (9th grade, 10th grade, 11th grade, and 12th grade). The analysis of the data yielded an F value of 2.84 with a p of .037 as reported in Table 4. Ninth grade students earned a GPA significantly higher than 11th grade students and 9th grade students earned a significantly high GPA than did 12th grade students as reported in Table 5.

Table 4
Analysis of Variance for Grade Point Average on Grade Level

Source	df	SS	MS	F	p
Between	3	5.20	1.73	2.84	.037
Within	619	377.32	.61		

Table 5
Grade Point Average of students by grade level and by site

Grade Level / Site	N	GPA	SD
9th Host Site	2	3.35	.92
9th Remote Site	54	3.43	.73
9th Total	56	3.43	.72
10th Host Site	70	3.19	.71
10th Remote Site	56	3.25	.58
10th Total	126	3.22	.65
11th Host Site	71	3.31	.57
11th Remote Site	90	3.08	.79
11th Total	161	3.18	.71
12th Host Site	56	2.87	1.16
12th Remote Site	224	3.16	.78
12th Total	280	3.10	.87

Objective 3

One way analysis of variance was used to test if differences existed between remote site students GPA and host site students GPA by individual course. There were no significant differences among the two groups (remote site and host site). The analysis yielded an $\underline{F}$ value of .51 with a $\underline{p}$ = .47 as reported in Table 6. There were significant differences between the groups by grade level. The analysis yielded an $\underline{F}$ value of 12.23 with a $\underline{p}$ = <.0001. Analysis of data of student achievement (GPA) by remote site or host site by individual course identified no significant differences. The analysis yielded an $\underline{F}$ value of .77 with a $\underline{p}$ = .62 as reported in Table 6.

Table 6
Analysis of Variance for Grade Point Average on Site Location and Individual Course

Source	df	SS	MS	F	p
Site	1	.262	.262	.511	.4749
Class	8	50.194	6.274	12.231	<.0001
Site * Class	8	3.186	.398	.776	.6237

When comparing student GPA by course we see differences in individual courses. All courses GPA's were identified as being significantly higher than GPA's in Vocational Marketing. Foreign Languages GPA's were significantly higher then GPA's in Vocational Marketing. Natural Resources GPA's, Chemistry GPA's, and Art GPA's were significantly higher than GPA's in Foreign Languages. Natural Resources GPA's were significantly higher than GPA's in Ag Business Mgt., Math, and Animal Science as reported in Table 7. Significant differences were found when grouping traditional vocational courses, Ag Business Mgt., Vocational Marketing, Natural Resources, and Animal Science, together and comparing to the traditional academic in student achievement as measured by Grade Point Average. Students in traditional academic courses (3.25 GPA) had a higher GPA than did students in vocational courses (2.99 GPA). The analysis yielded an F value of 13.56 with a p = .0003 as reported in Table 8.

Table 7

Individual Course Success (GPA) by Host Site and Remote Site

Course Name	Host Site		Remote Site	
	N	GPA	N	GPA
ForeignLanguage	91	3.29	140	3.06
Ag Business Mgt.	3	3.23	74	3.09
Vocational Marketing	14	1.70	7	2.00
Natural Resources	4	3.68	38	3.43
Math - Calculus	63	3.11	56	3.21
Chemistry	9	3.57	61	3.58
Art	5	4.00	9	4.00
Statistics	6	3.50	8	3.50
AnimalScience	4	3.43	31	2.88

Table 8

Analysis of Variance for Grade Point Average on Academic and Vocational Courses

Source	df	SS	MS	F	p
Between	1	8.18	8.18	13.56	.0003
Within	621	374.34	.60		

Conclusions, Implications and/or Recommendations

Students enrolled in distance education courses were primarily located at remote sites. Remote site students were provided the opportunity to take these courses because courses were being offered via distance education technology. Without this opportunity, most of these students (424) would not have been able to enroll in these courses. As students gained experience with distance education and grade level they enrolled in more courses being offered via distance education.

Receiving instruction by distance education resulted in no differences in grade point average for all students at either remote site or host site. Students in 9 th grade did have higher grade point averages then did 11 th grade and 12 th students. This can be attributed to the specific courses and complexity of courses taken by these groups of students. Twelfth grade students located at host sites had a significantly lower GPA than 12 th grade students located at remote sites. This area needs further analysis to determine exact reason for this occurrence.

Significant differences did not exist between all remote site students and all host site students in this study. It did make a difference if a student was in the same room with the teacher or if they were at a different location. Significant differences were found when grouping students by grade level and if they were located at remote site or host site. Remote site students in 9 th, 10 th and 12 th grades had a higher GPA than did their counterparts located at the host site.

Individual courses being offered via distance education revealed differences in student achievement. Vocational Marketing was significantly different than all other courses. After placing a phone call to the local administrator it was determined that the cause could have been that the teacher was in their first year of teaching and this was the first distance education course they had taught. Generally it did not matter if the student was at the remote site or host site for the instruction, student success was high or above average on all except one course.

Grouping traditional academic courses and comparing to the vocational courses offerings significant differences were revealed. Students taking traditional academic courses were receiving a higher GPA than those students taking vocational courses. This could have been because of the lack of applied hands-on activities in the vocational courses.

The results of the study offer promise that distance education courses do provide opportunities for students who would otherwise not be able to take these courses. Additionally student success, GPA, was above average (mean GPA whole group = 3.18) in these courses.

Further research needs to be conducted with populations of students to determine if there are differences in learning styles of students who are enrolled in distance education courses. This could have attributed to the success rate of students enrolled in these courses. Additionally, the quantity of distance education courses being taken by students may be a contributing factor to success.

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THE MOTIVATION OF STUDENTS TO PARTICIPATE IN DISTANCE EDUCATION: AN ASSESSMENT BASED ON HOULE'S TYPOLOGY

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Introduction

Distance education is not a new development. Nearly three centuries ago, distance education was being used to enhance educational opportunities in colonial America and in Europe. The formal use of distance education in colonial America can be traced back to 1728 when home study in shorthand instruction was offered in Boston (Valore & Diehl, 1987). From this first public opportunity for distance education in America, distance education continued to increase in popularity.

By the late 1800s, a movement to expand distance education programs began being fueled by individuals who believed that all citizens had a right to an education. One of these individuals, John Vincent, created a home reading circle to encourage adult learning in 1878. Vincent also was a member of the Chautauqua movement, an educational society established on the principle of access to education for all U.S. citizens (Lightly, 1971) and "the first significant distance education effort in America" (Moore, 1989, p. 223). Formal recognition of distance education occurred in 1883, when the State of New York granted the Chautauqua Institute authority to award degrees through the delivery method of home study (Valore & Diehl, 1987). Distance education continued to evolve over the next 100 years.

By the 1980s, 100 accredited programs offered external degrees via some method of distance education, and during the 1980s, Adult Learning Service (ALS) offerings provided educational opportunities to over a million adult learners on the Public Broadcast Service (PBS). In addition, an estimated 100,000 students completed courses via video tapes, video conferences, telelectures, and telecourses for college credit (Public Broadcasting Services, 1989). In 1993, the Electronic University, another consortia of universities blanketing the United States, enrolled over 300,000 students, more than 30,000 of them in degree programs (Peterson's Guides, 1993). As the 1990s progressed, the "use of the Internet is growing exponentially in universities around the world " (Harasim, Hiltz, Teles, & Turoff, 1995, p.79). Faculty, for example, are able to distribute course assignments, handouts, notes, and syllabi via e-mail or the Internet.

Specific to meeting the needs of teachers, both preservice and inservice, distance education opportunities are expanding across the United States (e.g., Collis, 1995; Herring, Smaldino, & Thompson, 1995; Knapczyk & Rodes, 1995; Wynn, 1997). In Iowa preservice teacher education programs are extending and refining programs through the use of the Iowa Communications Network's (ICN) distance learning capabilities. Through this distance education program, teacher educators have the opportunity to prepare students to be effective classroom teachers (Herring, Smaldino, & Thompson, 1995). A simpler, but equally effective approach to distance education is being used with teacher inservices in Indiana. Several low-cost delivery options such as audiographics, facsimile machines, and speaker phones are being used to teach these inservice courses (Knapczyk & Rodes, 1995).

This interest in distance education to meet both preservice and inservice teacher needs is due in no small part to the challenges facing higher education such as increased operating costs, reduced traditional student enrollments, reduced yearly course offerings to cut costs, and reduced numbers of faculty in an effort to restrain rising costs (U.S. New & World Report, 1991). To overcome these hurdles, administrators and faculty are challenged with identifying the changing needs of the students their respective institutions serve. Specifically, researchers see the need for additional study of what motivates students to participate in advanced education (e.g., Boshier, 1973; Boshier, 1976; Brown, 1986; Morstain & Smart, 1977; Verduin & Clark, 1991). As noted by Gordon, Olson, and Hamsher (1993) "A study of this nature is of primary importance to the success of programs involving non-traditional university enrollees. Knowing what motivates people to enroll and participate is central to the programs, not only in terms of obtaining initial enrollees, but also in terms of how to retain and better serve the population" (pp. 68-69). Further, as stated by Boshier (1988), "Program planning in adult education places a high priority on the importance of satisfying needs. Participant motivational orientations vary as a function of needs and planners have variously attempted to match program content and processes to orientations that impelled participants to enroll" (p. 7).

This study examines both distance education and student motivation to participate in distance education at the university level. A review of the literature revealed numerous definitions of distance education (e.g., Holmberg, 1989; Moore, 1989; Verduin & Clark, 1991; Wedemeyer, 1983). For example, Moore (1989) defined distance education as all arrangements for providing instruction through print or electronic communications media to persons engaged in planned learning in a place or time different from that of the instructor or instructors. Wedemeyer (1983) described distance education as all educational programs that are non-classroom based--independent study, out-of-school learning, and external studies. Specifically for this study, distance education was defined as all arrangements for providing instruction in a place or time, the majority of the time, different from the instructor. E-mail, facsimile machines, and printed material delivered by the U.S. Postal Service were the means of communication between instructor and students.

Purpose

The purpose of the study was to determine vocational teacher education students' level of motivation to participate in distance education in relation to seven factors based on Boshier's (1982) Education Participation Scale. Specifically, answers to the following questions were sought:

1. What is the level of motivation to participate in distance education of vocational teacher education students on each of the seven factors of Boshier's (1982) Education Participation Scale: communication improvement, social contact, educational preparation, professional advancement, family togetherness, social stimulation, and cognitive interest?
2. Is there a difference in the level of motivation of vocational teacher education students in relation to the seven factors of Boshier's (1982) Education Participation Scale: communication improvement, social contact, educational preparation, professional advancement, family togetherness, social stimulation, and cognitive interest?

Theoretical Base

Houle's (1961) typology assessed the activity, goal, or learning orientation of adult learners. Since the development of Houle's (1961) typology, numerous researchers have tested its usefulness in assessing learner motivation. Broshier's (1982) Education Participation Scale is one such instrument that has been developed based on Houle's (1961) typology of adult learning, and numerous subsequent studies support the continued use of

Houle's (1961) typology and Broshier's (1982) Education Participation Scale to assess the motivational levels of adults in an educational setting (e.g., Boshier & Collins, 1983; Boshier & Collins, 1985). Specific to vocational teacher education, Gordon et al. (1993) used Broshier's (1982) Education Participation Scale in their assessment of vocational, technical, and adult education graduate student motivation to enroll in off-campus teacher education courses.

Method

The procedures used during the study are discussed in the next section. Reviewed are the population, instrument, data analysis, respondent demographics, and findings.

Population. The population for this study consisted of all vocational teacher education students taking classes in the vocational teacher education program at California State University, San Bernardino (CSUSB) during the 1996 winter quarter. This particular population was picked for two reasons. First, it was the population of interest to the researchers. Second, this population builds upon the work of Gordon et al. (1993) in that it focuses on vocational teacher education students. Data were gathered through a questionnaire distributed to all 85 vocational teacher education students, a purposive sample that represented a variety of vocational education service areas.

Instrument. Motivation to participate in distance education was assessed through the use of Broshier's (1982) Education Participation Scale, which is applicable in a university setting. Its test-retest reliability and construct validity have been previously certified: test-retest reliability coefficients for the composite scales ranged from 0.76 to 0.89 (Brosher, 1982). The instrument consists of 42 questions grouped into the seven factors: communication improvement, social contact, educational preparation, professional advancement, family togetherness, social stimulation, and cognitive interest. These questions were arranged to form a 42-item Likert scale with four scoring categories. Participant response options are (1) no influence, (2) little influence, (3) moderate influence, and (4) much influence. Scores for all of the items on a particular factor are summed to form an index of participation for that factor. Reliability coefficients for the seven factors in the present study were as follows: 0.79 (communication improvement), 0.90 (social contact), 0.75 (educational preparation), 0.80 (professional advancement), 0.89 (family togetherness), 0.76 (social stimulation), and 0.81 (cognitive interest).

Data Analysis. Of the 85 surveys distributed, 83 (97.6%) provided analyzable data. A variety of analytical techniques were used to answer the two research questions. Descriptive statistics were used to present the means and standard deviations of the seven motivation factors. A one-way analysis of variance model was used to determine whether a significant difference existed between the means of the seven factors. The analysis of variance model produced a significant $F(6, 574) = 71.27$, $p < .01$. Since there were an equal number of responses for each factor, Tukey's Honestly Significant Difference (HSD) post-hoc procedure was used to determine which factors differed significantly (Gravetter & Wallnau, 1988). Specifically, the factors in which the mean difference is greater than 0.375 were statistically significant. All tests of significance were conducted at alpha = .01.

Respondent Demographics. Of the 83 respondents (50.6%) were male and (49.4%) were female. The youngest participant in the study was 25 years of age while the oldest was 65 years of age; the majority of participants were between 30 and 54 years of age (91.6%). Most respondents reported possessing either an associate's degree (34.9%) or a bachelor's degree (32.5%). In addition, the majority of participants reported being employed full time (74.7%) as well as carrying a full-time load of courses at the university (71.1%).

Findings. Table 1 shows the means and standard deviations for the seven factors. The means for the seven factors ranged from a high of 3.31 (0.70) for the factor professional advancement to a low of 1.61 (0.64) for the factor social stimulation.

Table 1

Factor	Mean	Standard Deviation
Communication Improvement	2.13	0.68
Social Contact	1.66	0.68
Educational Preparation	2.86	0.70
Professional Advancement	3.31	0.70
Family Togetherness	1.89	0.78
Social Stimulation	1.61	0.64
Cognitive Interest	2.64	0.71

The analysis of variance model produced a significant F (6, 574) = 71.27, $p < .01$. Tukey's HSD post-hoc procedure identified a number of differences among the various factors. Specifically, the factors in which the mean difference is greater than 0.375 were statistically significant. Table 2 shows the three most motivating factors for this study and those factors with which they were significantly different.

Table 2

Factor	vs Factors	* Significant at .01 level
PRAD	EDPR, COIN, COIM, FATO, SOCO, SOST	*
EDPR	PRAD, COIM, FATO, SOCO, SOST	*
COIN	PRAD, EDPR, COIM, FATO, SOCO, SOST	*

PRAD=Professional Advancement
EDPR=Educational Preparation
COIN=Cognitive Interest
COIM=Communication Improvement
FATO=Family Togetherness
SOST=Social Stimulation
SOCO=Social Contact

Discussion

It should be noted that the study participants were not a probability sample and thus may not necessarily be representative of all vocational teacher education students at CSUSB. However, the 85 study participants did represent all students enrolled in the vocational teacher education program during the 1996 winter quarter, and usable data was provided by 97.6% (n=83) of these 85 study participants. Both the high rate of participation and the high percentage of usable questionnaires enhances the credibility of this study's findings.

Overall, analysis of participant motivation revealed that the factors most influential in inspiring vocational teacher education students to participate in distance education were professional advancement, educational preparation, and cognitive interest. The least influential factors were communication improvement, family togetherness, social stimulation, and social contact. These findings are consistent with the results of previous studies assessing student motivation using Houle's (1961) typology and Broshier's (1982) Education Participation Scale.

Gordon et al.'s (1993) study of vocational education graduate students at off-campus locations reported that the majority of participants were motivated to take courses for professional and cognitive interest. These same students reported little motivation to participate in distance education for social contact or social stimulation reasons. In similar studies, Miller and Crawford (1990) noted that the greatest motivators in participating in distance education were cognitive interest and professional advancement. Lethbridge (1989), who studied the motivational orientations of baccalaureate nursing students in rural New England, found that the most compelling reasons for returning to school were professional advancement, knowledge, and improvements in social welfare skills.

The vocational teacher education students in this study reported the highest level of motivation with the factors of professional advancement, educational preparation, and cognitive interests. These results are consistent with those of Gordon et al. (1993), Lethbridge (1989), and Miller and Crawford (1990) in that advancement and preparation factors are major contributors to motivation. Thus, it may be necessary for administrators and faculty to cultivate programs that facilitate students' professional growth and advancement as opposed to social interactions if they wish to increase participation and retention of students enrolled in distance education programs.

Conclusions and Implications for Practice

The findings of this study have important implications for administrators and faculty. Given the importance of meeting the needs of future students and the costs associated with implementing a distance education program, it is imperative that administrators and faculty monitor the motivational levels and orientations of students and plan programs accordingly.

Clearly, a significant and a practical difference exists in the level of motivation to participate in distance education among vocational teacher education students in relation to the seven factors of Broshier's (1982) Education Participation Scale. The highest reported level of motivation was for the factors professional advancement and educational preparation with means and standard deviations of 3.31 (0.71) and 2.86 (0.70) respectively. The lowest reported level of motivation was for the factors social contact and social stimulation with means and standard deviations of 1.66 (0.68) and 1.61 (0.64) respectively. This study suggests then that distance education administrators and faculty, when planning distance education offerings for vocational teacher education students, focus chiefly on programs that promote participants' professional and the educational advancement of participants while minimizing concern for other factors such as social interaction.

Recommendations for Future Research

Based on a review of the literature and an analysis of the data, the following recommendations for future research are offered.

1. A replication of this study with a population from which a larger probability sample can be drawn should be conducted. Because developing a distance education program is expensive, a university system would serve as realistic sampling frame for this probability sample. This larger sample would allow for the development of a MANOVA model in which variables such as employments status, gender, and student status could be analyzed for their impact on the motivation to participate in distance education. The use of a probability sample would allow for enhanced generalizations.

2. Other variables such as age, miles traveled, level of education, and technology orientation could provide valuable insight into what motivates students to participate in distance education.

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AN EQUIVALENCY STUDY COMPARING PAPER-PENCIL AND INTERNET-BASED OCCUPATIONAL COMPETENCY TESTS

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Introduction

With the universal availability of microcomputers and easy access to the world wide web via the internet, it is logical to consider computer-based (CB) testing for a variety of purposes. The American Psychological Association (APA) (1986), in cooperation with other professional associations, published Guidelines for Computer-Based Testing in recognition of the growing use of computers for testing purposes. In this document, specific attention is given to the need to establish the equivalency of any test that is converted from paper/paper (PP) to computer administration. Furthermore, users of CB tests and interpretations are cautioned to be aware of any inequalities resulting from mode of administration.

Over the past 20 years, the majority of research on CB testing has been done on adaptations of cognitive and affective measures that were originally PP versions. Most of this research utilized the mainframe or microcomputer as the delivery method with the test itself stored on some type of local memory devise (e.g., floppy disk, hard drive, etc.). As far back as 1974, Lushene, O'Neil, and Dunn conducted an equivalency study of PP and CB versions of the well known MMPI personality measure, and found no statistically significant differences. However, a study by Watts, Baddeley and Williams (1982) which investigated the equivalence of the PP and CB versions of Ravens Progressive Matrices (a cognitive measure) found that the CB version did yield different scores and therefore required different norms.

Several studies by Vansickle, Kimmel and Kapes (1989), Kapes and Vansickle (1992), and Vansickle and Kapes (1993) investigated the equivalence of several interest inventories (i.e., Strong-Campbell Interest Inventory, & Harrington-O'Shea Career Decision-Making System) and found that the CB versions were equivalent. Moreover, they concluded that in some cases the CB form appeared to be both more reliable and less time consuming. Federico and Liggett (1989) conducted a study with U. S. Navy personnel comparing PP and CB versions of a test of semantic knowledge. Estimates of internal consistency reliability, equivalencies, and discriminate validities were computed. In general, equivalency was supported, but some differences were found which favored the CB version. Sandals (1992) compiled an overview of the applications of CB assessment and diagnosis in education and psychology. Included were such topics as the history of computer testing, the advantages of CB assessments and the construct validity of CB tests.

In a study that focused only on the setting of passing scores using traditional standard-setting methodology, Faggen et al. (1995) compared PP and CB presentation of items. No differences were found. The use of CB testing is particularly relevant to the issue of skills standards given the current trend in vocational education to develop standards and tests to measure performance against these standards (Rahn, 1994). Although 20 or more years of research has been conducted on some aspects CB testing, no studies were uncovered which used the internet as the mode of delivery.

Purpose of the Study

The purpose of this study was to determine if tests of occupational competency administered by computer over the Internet are equivalent to the same tests administered by conventional paper and pencil format. The Vocational-Technical Consortium of the States (V-TECS) item bank for the occupations of Child Care and Auto Body were selected as representative exams for the purpose of this study. The primary research question was:

To what extent do internet-based tests using questions from the V-TECS item bank yield the same results as paper and pencil tests using the same items?

To answer this question, a test-retest design was implemented in which high school vocational students were randomly assigned to one of four groups: Paper/Pencil followed by Paper/Pencil (PP), Paper/Pencil followed by Computer (PC), Computer followed by Paper/Pencil (CP), and Computer followed by Computer (CC). In addition to the primary research question, it was also the intent of the study to examine the moderator variables of gender, ethnicity, disadvantaged status, disability, and grade level to determine if the results obtained were consistent across subgroups. To answer the primary research question and to examine the effects of moderator variables, the following specific questions were formulated:

1. For the eight schools (A - H), combining forms P and C: a) What is the relationship between the scores for the first and second administrations? b) What is the difference between the Means (M) and Standard Deviations (SD) for the first and second administration?
2. For each of the four groups (PP, PC, CP, CC): a) What is the relationship between the scores for the first and second administrations? b) What is the difference between the Means (M) and Standard Deviations (SD) for the first and second administration?
3. For the two groups (Paper-All & Computer-All): a) What is the difference between the first and second administrations? b) What is the difference between the two forms?
4. For the first and second administrations, what is the difference among the four groups (PP, PC, CP, CC) and two groups (P & C)?
5. Assuming different Pass/Fail cutoffs (i.e., 40%, 50%, 60%. 70%, 80%) what is the hit rate for the four groups?
6. For the first and second administrations, what is the difference between: a) Educational Disadvantaged and Other, b) Economically Disadvantaged and Other, c) Disabled and Other, and d) Grade 12 and Other?
7. For the first and second administrations, is there an interaction between membership in the above named four groups (Educationally Disadvantaged, Economically Disadvantaged, Disabled, Grade 12), and performance on the paper/pencil (P) vs. computer (C) forms?

Moderator variable analysis was not possible using gender and ethnicity due to the small numbers in the samples obtained. The Child Care sample was almost entirely female (98%) and the Auto Body sample was almost entirely male (93%). The Child Care sample was 5% minority while the Auto Body sample was 7% minority.

Method

Participants

The two samples for this study consisted of 11th and 12th grade vocational students in eight high schools in Pennsylvania who were enrolled in either the Child Care or the Auto Body program.

The initial Child Care sample consisted of 142 students, while the initial Auto Body sample consisted of 137 students. After an inspection of the raw data it was decided to drop students from each sample if their scores did not appear to be valid. The following decision rules were applied to drop students from the sample: (1) Students whose scores decreased 20 points or more from the first administration to the second administration, or (2) Students whose scores were within 1 standard error of the guess rate (25 + 4=29). The usable sample for the Child Care component of the study consisted of 125 females and 3 males for a total of 128. The usable sample for the Auto Body component of the study consisted of 91 males and 7 females for a total of 98.

The students were randomly assigned to one of the following four conditions within a test-retest design: Group 1= PP; Group 2= PC; Group 3= CP; Group 4= CC. The 128 Child Care student groups were of the following size: Group 1, n = 37; Group 2, n = 34; Group 3, n = 28; Group 4, n = 29. The 98 Auto Body students were grouped as follows: Group 1, n = 20; Group 2, n = 30; Group 3, n =23; Group 4, n = 25.

The 128 Child Care participants were also reported in the following groups which were used as moderator variables: Educationally Disadvantaged, n = 42; Economically Disadvantaged, n = 24; Disabled, n = 18, Grade 12, n = 58. The 98 Auto Body participants were identified as follows: Educationally Disadvantaged, n = 43; Economically Disadvantaged, n = 12; Disabled, n = 20, Grade 12, n = 37.

Instrumentation

The two tests consisted of sets of items provided by the Vocational-Technical Educational Consortium of States (V-TECS). This organization is a consortium of 23 state organizations which provides members with competency based vocational-technical outcome standards, curriculum resources and assessment vehicles. The tests were already in electronic media and easily incorporated into the WebTester architecture. Each test consisted of a series of multiple choice questions with four alternatives, selected from various test item banks to reflect the skills required for the occupation. Both tests used to compare paper/ pencil with internet-based testing had 100 questions each. Questions were reviewed by vocational instructors during test construction.

The tests were administered in two forms - over the Internet and an equivalent paper/pencil version on each occasion. The paper/pencil version used Scantron forms to record the answers and were scored using the Scantron ParScore System. Each participating school registered students and received passwords by submitting a special Student Registration Form. These forms provided the demographic information on the student population (i.e., gender, ethnicity, grade and special needs) using Student Identification Numbers. No student names were included, and the Student Identification Numbers were known only to the home school. Using this rather simple approach, student anonymity and privacy was ensured.

Procedure

Tests were administered in group sessions at the school, either in computer/internet laboratories or in multiple locations in the school simultaneously. The internet version was accessible only during this limited window to the selected school sites. Internet access was provided to the schools either through a local university, through local commercial suppliers or through the state/local government.

Most participating schools were equipped with early Pentium or 486-compatible hardware to access the internet. These systems are considered small to medium sized in today's market. Such advances as JAVA, audio, video and enriched browsers, typically are configured for larger more modern computers. The software used in the project was configured to operate under Netscape Navigator 2.0 on an Intel 486 with 4 meg of RAM or larger.

Each site was requested to designate one person as the Test Administrator. Typically, this was either a computer sciences/electronics instructor with some technical knowledge or else an administrative person. Site visits to discuss the internet testing project and explain the testing procedures were made prior to the first scheduled testing session and, in some cases, based on problems in the first session, between the first and second scheduled sessions.

The study was conducted between the middle of April and early May in the Spring semester of 1997. The first and second administrations of the exams occurred approximately two to three weeks apart.

Analysis

The initial approach to analyzing the data was to relate and compare the first and second administrations by schools and by forms using correlational analysis and group difference statistics (i.e., r, t, F, and Homogeneity of Variance). A hit rate analysis was employed to examine the actual number of participants who either passed or failed both administrations using assumptions of 60%, 70% and 80% pass-fail cutoffs for the Child Care sample. Since the Auto Body sample scores were on the average much lower, pass-fail cutoffs of 40%, 50%, and 60% were used. A hit is definrd as reaching the same decision (pass or fail) for two separate administrations.

The data were also analyzed by first and second administration according to the following groups: Educationally Disadvantaged, Economically Disadvantaged, Disabled, and Grade 12. Independent t-tests were performed to examine the differences between members and non-members of each of these groups. Because interaction between the four moderator variable groups (Educationally Disadvantaged, Economically Disadvantaged, Disabled, and Grade 12) and two exam format groups (paper/pencil vs. computer), were important to examine, a 2 X 2 ANOVA was used. The SPSS 7.5 for Window 95 was used to conduct all data analyses. When statistical significance testing was employed, the .05 and .01 levels were used.

Results

All results are presented in table form and are discussed here separately for the Child Care and Auto Body samples. While the eight schools involved were utilized only as sampling units, overall performance by school independent of form (P or C) was examined to assess the variability that could be expected from one school to another.

Child Care

Table I reports the results of the analysis across the eight schools both as a correlation and a difference between the first and second administrations. For the correlational analyses it can be seen that the coefficients ranged from .65 to .84 with the overall correlation being a relatively high .79. When differences were examined, the mean scores went up for the second administration in all but two schools; however, none of the differences were statistically significant. The overall increase was 1.1 points (68.5-69.6) and although small, was statistically significant given the large total sample.

For question 2 which explored the correlation and differences within the four test-retest groups (PP, PC, CP, CC) the analyses is presented in the middle section of Table I. From the table it can be seen that three of the four correlations were above .80 with only the PC group being appreciably different (r=.69). For the two groups that took the same form twice, the correlations were only .02 apart (.83 vs. .81). These relatively high coefficients can be interpreted as test-retest reliabilities. The middle two coefficients resulting from the two different forms in both orders (PC & CP) can be interpreted as parallel form reliability/ equivalency, or concurrent validity, depending on one's point of view. In any case, while the difference between these two coefficients is substantial (.15), it is well within the range of sampling fluctuations observed in the school comparisons. When the first and second administrations were compared for differences, the second yielded higher scores for three of the four groups and overall, but only the CP group and totals were statistically significant. These differences could be interpreted as gains due to practice effect.

For question 3 which compared Paper-all with Computer-all, the analysis is reported at the bottom of Table I. For Paper-all there were no differences between first and second administrations. However, for Computer-all, the second administration yielded an average increase of 4.3 which was just short of the .05 level of statistical significance. When Paper-all were compared to Computer-all within each of the first and second administrations, the computer yielded a lower score by 3.4 points in the first administration, but a higher score by .9 in the second administration. Neither difference was statistically significant due to the relatively small sample sizes. This pattern of differences could be interpreted as a practice effect favoring the computer.

Table 2 presents the analysis for question 4 which examined the differences among the four groups (PPCC/PCPC) and two groups(PC)`in each of the two administrations. Although some variations in means (M) and standard deviations (SD) are apparent, none are different enough to be statistically significant. Therefore, the scores in all groups can be interpreted as being equal except for expected sampling fluctuations. The second administration can be considered as a replication of the first, lending support to the conclusion of no differences.

Differences among the four test-retest groups using hit rate analysis is reported in Table 3. This analysis examines the extent to which the same decision would be made (a Hit) with the first and second administration assuming a pass-fail cutoff was set at 60%, 70% or 80%. From this analysis it can be seen that overall, the decisions became more

Table 1 (Child Care)

Correlation, Mean, Standard Deviation and t-test for First and Second Administrations.

Sample	n	r_{FS}	First		Second		t	p
			M	SD	M	SD		
A	17	.83	75.1	8.8	74.7	11.5	.22	.82
B	27	.79	69.8	10.2	72.4	11.5	-1.90	.07
C	28	.84	68.2	15.6	69.0	14.6	-.49	.63
D	8	.77	69.9	15.0	74.1	11.2	-1.27	.25
E	10	.82	63.1	14.1	68.8	14.3	-2.14	.06
F	19	.69	64.7	9.8	63.7	10.0	.55	.59
G	10	.65	62.1	13.4	64.3	8.8	-.69	.51
H	9	.77	68.1	10.8	68.9	13.6	-.27	.79
Total	128	.79	68.5	12.5	69.6	12.5	-2.04	.04
Paper-Paper	37	.83	68.0	12.1	67.4	12.1	.54	.59
Paper-Computer	34	.69	71.3	11.7	72.0	10.0	-.43	.67
Computer-Paper	28	.84	68.1	12.4	71.5	13.8	-2.38	.03
Computer-Computer	29	.81	64.7	13.8	67.9	14.0	-1.99	.06
Total	128	.79	68.5	12.5	69.6	12.5	-2.04	.04
Paper-all			69.2 (n = 74)	12.1	69.2 (n = 65)	12.9	.017	.99[a]
Computer-all			65.8 (n = 62)	13.1	70.1 (n = 63)	12.1	-1.88	.06[a]
t			1.55[b]		.42[b]			
p			.12		.68			

Note. [a] Independent t-test computed with some subjects having two scores in their respective group.

[b] Independent t-test between paper and computer scores in different administrations.

Table 2 (Child Care)

Comparisons Between Four Groups (PP, PC, CP, CC) and Two Groups (P vs. C)

Group	*n*	*M*	*SD*	*F*	*p*
First Administration					
P	38	67.8	12.1	1.56	.20
P	36	70.7	12.2		
C	29	67.8	12.3		
C	33	64.2	13.8		
P	74	69.2	12.1	2.39	.12
C	62	65.8	13.1		
Second Administration					
P	37	67.4	12.1	1.21	.31
C	34	72.0	10.0		
P	28	71.5	13.8		
C	29	67.9	14.0		
P	65	69.2	12.9	.18	.68
C	63	70.1	12.1		

Note. The variance of the four groups in each administration are homogeneous (p = .93 and p = .12 in the first and second administration respectively using Levene's test for equality of variances).

Table 3 (Child Care)

Hit Rate for 60%, 70% and 80% Correct Between First and Second Administration

% / Sample	*n*	Hit			
		At / Above	Below	Total	Total %
60%					
Total	128	95	19	114	89
Paper-Paper	37	25	8	33	89
Paper-Computer	34	28	1	29	85
Computer-Paper	28	22	5	27	96
Computer-Computer	29	20	5	25	86
70%					
Total	128	62	44	106	83
Paper-Paper	37	17	14	31	84
Paper-Computer	34	20	9	29	85
Computer-Paper	28	13	8	21	75
Computer-Computer	29	12	13	25	86
80%					
Total	128	10	91	101	79
Paper-Paper	37	3	29	32	86
Paper-Computer	34	2	22	24	71
Computer-Paper	28	3	18	21	75
Computer-Computer	29	2	22	24	83

reliable as the pass-fail cutoff decreased (79%,83%,89%). Also, the PP combination yielded consistent decisions 89%, 84% & 86% of the time (M=86.3 %), while the CC combination yielded consistent decisions 86%, 86% & 83% of the time (M=85). Both of these average hit rates were higher than the mixed groups (PC=80.3%, CP=82%), and not different enough from each other to be considered anything more that sampling fluctuations. They also indicate that at any of the pass-fail cutoffs examined, either form would yield reasonably reliable decisions.

Table 4 reports the analysis between the two groups compared for the four moderator variable for both first and second administrations. As might be expected, the Educationally Disadvantaged and Disabled groups performed less well than their counterparts on both first and second administrations at a statistically significant (.05) level. The Economically Disadvantage group also performed less well, but the difference was just short of statistically significant in the first administration, and not as extreme in the second administration. Surprisingly, there were negligible differences between the grades, indicating that the students with an extra year of training in the discipline did no better than their less trained counterparts.

Eight analyses were conducted which examined the interaction between group membership for each moderator variable and performance on the paper/pencil or computer administrations. For all eight analysis, both first and second administrations, no interactions were found. In other words, whether or not the two groups for each moderator variable differed on their performance on this exam, these differences were not related to which form of the exam they took.

Auto Body

The analysis across the eight schools for both the correlations and differences between first and second administrations is reported in Table 5. The correlations are lower than for the Child Care sample and range from .48 to .92 with the overall correlation being a moderately high .70. Again, when differences were examined, most increased somewhat in the second administration with several schools and the total yielding statistically significant increases. Differences among schools appear to be normally expected sampling fluctuations. Increases from first to second administration can be reasonably attributed to practice effect.

The question 2 analysis is also reported in Table 5, in the middle section. The correlations ranged from .64 to .81 with CC (.78) exceeding PP (.64) by .14 which is a considerable difference in favor of the CC group . However, given the differences between the two mixed groups (.66 vs. .81) it is difficult to say if this is anything more that sampling fluctuations.

Comparison between the first and second administrations showed that three of the four increased, with the two largest increases being those who took their second exam on the computer, which could indicate a greater practice for the computer. Overall, both the scores and the correlations are lower for the Auto Body sample compared to the Child Care sample, possibly due to larger number of scores in this sample that came into question on the basis of individual score validity.

Question 3 compared Paper-all to Computer-all for first and second administrations and is reported at the bottom of Table 5. From the first to second administration, the computer scores increased more, but neither gain was statistically significant. When Paper-all was compared to Computer-all in each administration, the Computer scores were higher

Table 4 (Child Care)

Educationally Disadvantaged, Economically Disadvantaged, Disabled and Grade Totals

Time / Group	*n*	*M*	*SD*	*t*	*p*
First Administration					
Ed Disadv	42	63.7	12.5	-2.46	.02
Other	94	69.4	12.4		
Econ Disadv	24	63.2	11.6	-1.92	.06
Other	112	68.6	12.7		
Disabled	18	57.9	13.4	-3.66	.001
Other	118	69.1	11.9		
Grade 12	58	67.6	13.1	-.07	.94
Other	78	67.7	12.4		
Second Administration					
Ed Disadv	41	66.2	12.3	-2.17	.03
Other	87	71.2	12.3		
Econ Disadv	21	67.4	9.6	-.90	.37
Other	107	70.1	13.0		
Disabled	16	61.2	12.1	-2.98	.004
Other	112	70.8	12.1		
Grade 12	55	68.6	12.4	-.79	.43
Other	73	70.4	12.6		

Table 5 (Auto Body)

Correlation, Mean, Standard Deviation and t-test for First and Second Administrations.

Sample	*n*	r_{FS}	First		Second		*t*	*p*
			M	*SD*	*M*	*SD*		
A	10	.59	53.5	8.7	56.9	7.6	-1.45	.18
B	18	.48	46.1	7.7	46.8	6.8	-.41	.68
C	14	.63	55.0	10.5	53.8	8.9	.53	.60
D	21	.78	44.6	11.7	48.4	10.4	-2.38	-.03
E	14	.92	51.4	9.6	51.2	11.2	.18	.86
F	7	.43	36.1	5.8	45.6	9.8	-2.78	.03
G	7	.67	47.4	10.6	54.9	8.4	-2.45	.05
H	7	.58	46.3	7.8	43.4	10.1	.89	.41
Total	98	.70	48.0	10.5	50.1	9.8	-2.62	.01
Paper-Paper	20	.64	45.1	8.1	46.3	9.9	-.72	.48
Paper-Computer	30	.66	48.4	12.7	52.8	8.5	-2.57	.02
Computer-Paper	23	.81	48.7	8.9	47.8	8.7	.76	.46
Computer-Computer	25	.78	49.1	11.0	51.8	11.1	-1.82	.08
Total	98	.70	48.0	10.5	50.1	9.8	-2.62	.01
Paper-all			46.3 (n = 57)	11.1	47.1 (n = 43)	9.2	.38[a]	.70
Computer-all			49.2 (n = 53)	9.7	52.4 (n = 55)	9.7	1.68[a]	.10
t			1.46[b]		2.72[b]			
p			.15		.01			

Note. [a] Independent t-test computed with some subjects having two scores in their respective group.

[b] Independent t-test between paper and computer scores in different administrations.

(46.3 vs. 49.2 & 47.1 vs. 52.4) with the latter being statistically significant. This could be interpreted as a greater practice effect for the computer.

The question 4 analysis is presented in Table 6 and compared both the four groups (PPCC/PCPC) and the two groups (PC) in both first and second administrations. Neither of the comparisons yielded statistically significant differences in the first administration, but in the second administration the computer groups yielded the highest scores in both the four group and two group analysis, the latter being statistically significant. This again can be interpreted as a greater practice effect favoring the Computer. Differences among the standard deviations were also detected in the first administration, but there does not appear to be a pattern favoring either group.

Differences among the test-retest groups using hit rate analysis are reported in Table 7. Because the overall scores on the Auto Body exam were lower than for the Child Care exam, the hit rates were analyzed for pass-fail cutoffs of 40%, 50% and 60%. It can be seen from the table that the best hit rate was achieved at the 60% level, the same as for the Child Care exam, but the pattern of increasing hit rate with lower cutoffs did not emerge. The average hit rate across the three hit rates for the PP combinations was 76.6% while the average for CC was 82.6%, a difference of 6% favoring the CC group. While the hit rate for all four groups was a very high 92% for the 60% analysis, it should be noted that only 10 of the 98 students passed on both occasions. Also, the highest average hit rate was achieved by the CP group (88.3%), with the PP group having the lowest hit rate. It is difficult to know, given the questionable validity of some of the individual scores in this data set, if these observed differences represent a pattern or are simply sampling fluctuations.

Table 8 reports the analysis for question 6 comparing the two groups for each of the four moderator variables. For both the first and second administrations, both the Disabled group (lower) and the Grade 12 group (higher) yielded statistically significant differences. This is a somewhat different finding than for the Child Care analysis which yielded differences for the Educationally Disadvantaged, but none for Grade 12. In this sample, the expected finding of Grade 12 students performing better than their less trained counterparts did occur. Also, both Child Care and Auto Body analyses yielded lower scores for the Disabled group which is an expected finding, but no differences were found for either of the Disadvantaged groups.

The eight analysis that examined interactions between the moderator variables and mode of administration found none to be statistically significant. Therefore, as with the Child Care sample, the performance of the four groups in the moderator analysis did not differ based upon which version of the exam they took (P or C).

Table 6 (Auto Body)

Comparisons Between Four Groups (PP, PC, CP, CC) and Two Groups (P vs. C)

Group	*n*	*M*	*SD*	*F*	*p*
First Administration					
P	24	43.3	8.6	1.93	.13
P	33	48.6	12.2		
C	25	49.1	8.7		
C	28	49.3	10.7		
P	57	46.3	11.1	2.13	.15
C	53	49.2	9.7		
Second Administration					
P	20	46.3	9.9	2.58	.06
C	30	52.8	8.5		
P	23	47.8	8.7		
C	25	51.8	11.1		
P	43	47.1	9.2	7.41	.01
C	55	52.4	9.7		

Note. The variances of the four groups in the first administration are heterogeneous ($p = .04$) and those in the second administration are homogeneous ($p = .51$) by using Levene's test for equality of variance.

Table 7 (Auto Body)

Hit Rate for 40%, 50% and 60% Correct Between First and Second Administration

% / Sample	*n*	Hit			
		At / Above	Below	Total	Total %
40%					
Total	98	69	9	78	80
Paper-Paper	20	11	2	13	65
Paper-Computer	30	20	2	22	73
Computer-Paper	23	19	3	22	96
Computer-Computer	25	19	2	21	84
50%					
Total	98	37	35	72	74
Paper-Paper	20	5	9	14	70
Paper-Computer	30	14	8	22	73
Computer-Paper	23	8	10	18	78
Computer-Computer	25	10	8	18	72
60%					
Total	98	10	80	90	92
Paper-Paper	20	1	18	19	95
Paper-Computer	30	5	22	27	90
Computer-Paper	23	0	21	21	91
Computer-Computer	25	4	19	23	92

Note. The total hit rate for the 70% and 80% cutoff level are 98.0% and 100% respectively.

Table 8 (Auto Body)

Educationally Disadvantaged, Economically Disadvantaged, Disabled and Grade Totals

Time / Group	*n*	*M*	*SD*	*t*	*p*
First Administration					
Ed Disadv	43	48.9	10.0	-.95	.34
Other	67	47.0	10.8		
Econ Disadv	12	49.9	7.3	.77	.45
Other	98	47.5	10.8		
Disabled	20	40.4	10.5	-3.66	.001
Other	90	49.4	9.8		
Grade 12	37	53.6	9.3	4.54	.001
Other	73	44.7	9.9		
Second Administration					
Ed Disadv	41	52.1	9.2	1.79	.08
Other	57	48.6	10.0		
Econ Disadv	12	52.8	9.1	1.02	.31
Other	86	49.7	9.9		
Disabled	15	63.2	10.0	-3.08	.003
Other	83	51.3	9.3		
Grade 12	34	54.0	9.6	3.00	.003
Other	64	48.0	9.3		

Conclusions and Discussion

The conclusions are presented here in respect to the specific questions posed. In addition, observations and discussion relevant to the general research questions are presented.

1. The school-to-school variations observed appear to be reasonable sampling fluctuations that could be expected from samples of the size utilized in this study.
2. From the correlational analysis between the two administrations, the internet-based computer version was judged to be equivalent to the paper/pencil version.
3. Also, from the analysis of group means and standard deviations, no differences favoring either version of the tests are apparent. However, for all groups studied, there was an increase in scores for the second administrations which is likely due to practice effect.
4. When student scores are compared on paper/pencil vs. computer overall, the computer scores gained more upon second administration. This is, the practice effect appears to benefit the computer version more than it does the paper/pencil version.
5. When hit rate analysis was used as the basis for comparison between the two versions, small differences were found, but they did not consistently favor either version. It should be noted, however, that where the pass-fail cutoff is set substantially changes the proportion of consistent decisions made. The 60% cutoff yielded the best results for both test.
6. Concerning group membership which might be expected to affect the text results, being Educationally Disadvantaged and Disabled does affect performance negatively. However, the performance of both Disadvantaged groups studied varied somewhat among the comparisons examined. Also, being in Grade 12, and therefore having an additional year of instruction, affected the test scores for the Auto Body sample, but surprisingly not the scores for the Child Care sample.
7. Although group membership as discussed above did affect test scores in some cases, mostly in the expected direction, no differential effect was found for the two version of the tests. Therefore, performance on either test was not effected by the test form (PP or CB).

The general conclusion that can be reached from all these analyses is that the two versions (paper/ pencil or internet-based computer) are equivalent. Furthermore, the several special populations studies (Economically Disadvantaged, Educationally Disadvantaged and Disabled) can be expected to perform approximately the same on either version. Concerning gender and test form differences, the conclusions reached do not differ for either test studied. Although the scores on the Child Care exam (taken mostly by females) were much higher than the scores on the Auto Body exam (taken mostly by males), the outcome was the same in respect to the questions posed. From the data analyzed it is not possible to ascertain if Child Care students mastered the subject matter better than did the Auto Body students, or if the Child Care exam was not as difficult. However, because it was necessary to eliminate many more subjects from the Auto Body data set (39 vs. 14) due to apparently invalid scores, or because one score was missing, it can be speculated that the Auto Body students may not have been as highly motivated to achieve as were the Child Care students.

These results appear to be consistent with and add to the growing body of literature comparing paper/pencil and computer-based testing and, in general, finding them equivalent. If the small trends and differences found could be interpreted as meaningful and enduring, it might be said that the CB format might yield higher scores after participants have had sufficient practice with this format. The reason for this can only be speculated upon, but it might be that the presentation of items, one at a time on the computer screen, my be less distracting than the traditional paper/pencil format. This could also result in higher reliabilities and less time for testing after sufficient practice on the computer. Higher reliabilities and less time taken for the computer version were found in the several studies of interest inventories by Vansickle, Kimmel and Kapes (1989), Kapes and Vansickle (1992), and Vansickle and Kapes (1993). Whether the internet version of CB tests differ from the more common terminal-based versions cannot be known from this study, but the use of the internet to deliver tests appears to provide for greater flexibility and economy of scale, if test security problems can be solved.

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